



Installation Manual

AX-201

PHILIPS

Assembleon
Integrated electronics manufacturing solutions

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Installation Manual

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CHAPTER 1 Introduction

1.1 Introduction

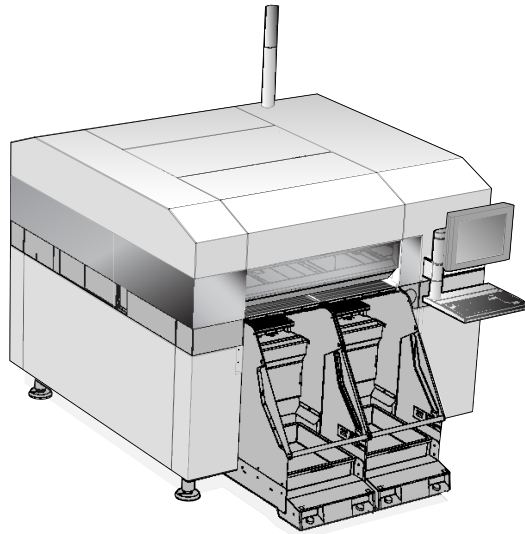


Figure 1 AX-201

Before installing this machine, make sure that the site is in accordance with the pre-installation instructions (see Pre-installation Manual AX-201).

The information in this manual is intended to be a guide for the installation of this machine, including built-in options.

1.2 Skills

The described (re-)installation may only be carried out by trained service/maintenance engineers.



NOTE: Engineers are expected to be informed about the content of:

- The Operating Manual AX-201
- The Service Manual AX-201.

1.3 Tools

For installation of the machine the following tools are recommended:

Item	Description	Reference
Set-up tooling kit	This kit contains a set of adjustment and calibration tools.	9.1.3.Setup tooling kit (PA 2435/00)
Maintenance kit	A collection of spare parts and materials that enables the customer to perform preventive maintenance, and also simple repairs that do not require specific knowledge or tools.	9.1.1.Maintenance kit (PA 2440/00)
Recommended standard tools	Tools that are used for general purposes during service and maintenance activities. Local purchase by the customer is expected.	9.1.4.Recommended standard tools

Figure 2 Recommended tools

1.4 Machine dimensions and weights, crated and uncrated



NOTE: For some (European) markets this machine can be packed in just foil and placed on a crate bottom, leading up to a simplified unpacking procedure.

	Crated		Uncrated	
Name of crate	Weight (kg)	Dimensions (mm)	Weight (kg)	Dimensions (mm)
Machine	2350	2650 x 2150 x 1900	1950	See figure 4
A-series tray trolley	248	1070 x 770 x 1270	200	-
4 Feeder trolleys	400	1200 x 2360 x 1150		
1 Feeder trolley	100	1200 x 720 x 1150	90	-

Figure 3 Crate weights and dimensions

1.5 Machine dimensions, with accessories

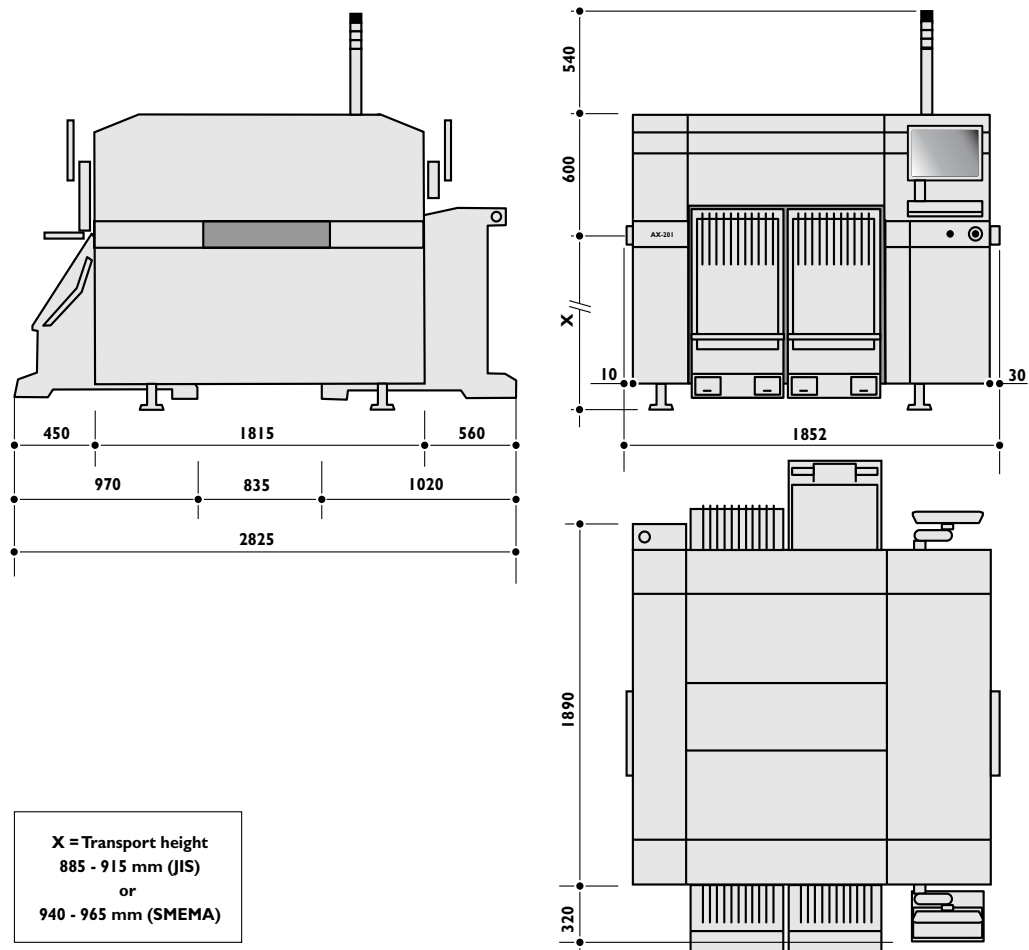


Figure 4 Machine dimensions, with accessories

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CHAPTER 2 Safety

2.1 General

For the correct and safe use of this machine, it is essential that all personnel should follow the safety procedures specified in this manual.

All manuals have danger, warning and cautionary statements where applicable.

Danger, warning and cautionary statements and / or symbols are present on the machine where applicable.

2.2 Personnel qualification

Operation, adjustment, maintenance and repair of this machine shall be carried out by **qualified and trained** personnel only.

The following training levels are defined:

- Operator level.
- User or supervisor level.
- Maintenance or service level.



NOTE: For each level an official Assembléon training is available.

2.3 Basic safety rules

- Do not use the machine in an environment where flammable gasses are present or where it is extremely dirty.
- When any personal protection equipment (PPE) is mentioned, it should be used in accordance with the manufacturers instructions.
- Do not defeat or bridge safety devices, connectors etc.
- Use only Assembléon recommended spares and tools.
- Keep fingers and other body parts outside the machine.

2.4 Safety compliance

The safety of this machine is based on industry-specific criteria (international codes, regulations, and standards).

Since this machine is designed for operation in a flow line, full mechanical safety in accordance with these criteria is only guaranteed when openings of the run-in and run-out sections are covered by the preceding and succeeding equipment in the flow line.

This machine should not be operated as a stand-alone machine.

2.5 Danger, warning and caution

■ Danger

Danger indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

A danger statement is displayed in this manner:



HAZARD IDENTIFICATION

Hazard consequence.
Hazard avoidance.

■ Warning

Warning indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

A warning statement is displayed in this manner:



HAZARD IDENTIFICATION

Hazard consequence.
Hazard avoidance.

■ Caution

Caution indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury. It may also be used to alert against unsafe practices.

A caution statement is displayed in this manner:



HAZARD IDENTIFICATION

Hazard consequence.
Hazard avoidance.

2.6 Safety stickers




Pictogram	Category	Meaning
	1 Warning	DANGER OF CLAMPING FINGERS Serious injury to fingers. Keep hands away from moving parts.
	2 Warning	DANGER OF STRONG MAGNETIC FIELD Pacemaker and metal prosthetic users are at risk of serious injury or death. Stay away from the magnets.
	3 Warning	DANGER, HIGH VOLTAGE Contact may cause electric shock or burn. Turn off & lock out system before servicing.

Figure 5 Safety stickers

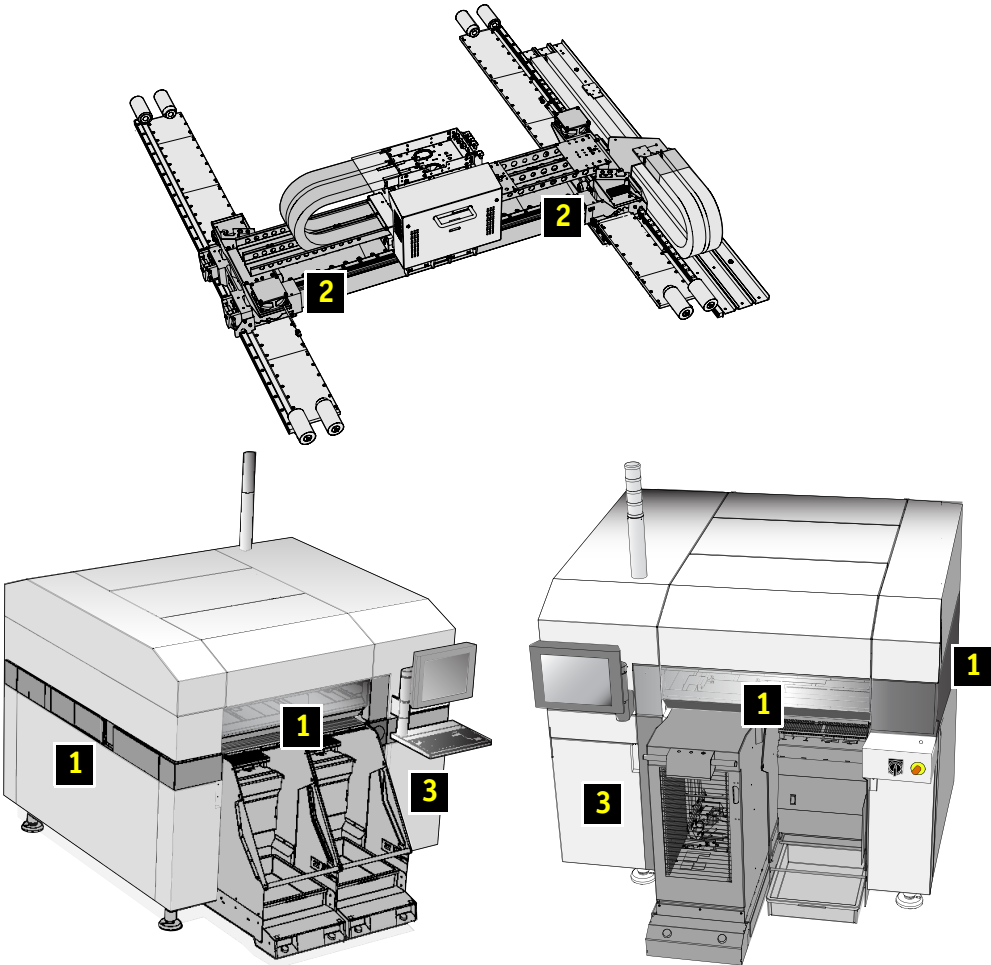


Figure 6 Location of safety stickers

2.7 Safety devices

	Safety device	Hazard protected	Detection method	Machine condition after safety device is activated
1	Emergency stop button front and rear	Hazardous moving parts.	Safety circuit interruption by pushing the emergency stop button.	All moving parts will be stopped and power to servo systems is turned off.
2	Safety interlock.	Hazardous moving parts.	Safety circuit interruption by opening hood rear.	
3			Safety circuit interruption by opening hood front.	
4			Safety circuit interruption by lowering any trolley.	
5			Safety circuit interruption by removing any trolley lift cover.	
6	"Start on" button. PA 2410/00 only.	Uncontrolled power up	Preventing uncontrolled power up of machine after power failure.	Power to the machine is turned on.
7	Electrical disconnect.	Hazardous voltage.	Mains power supply to the machine interruption by turning the electrical main switch to 'off'.	All power to the machine is turned off.
8	Air disconnect.	Hazardous air pressure.	Main air supply to the machine interruption by turning the main air switch to 'off'.	All air pressure to the machine is turned off, and present air pressure is released safely.
9	Enabling switch front and rear	Hazardous moving parts	Device for running the machine with the front or rear hood opened, when troubleshooting, teaching or servicing. See 2.7.1.Enabling switch front/rear, usage	The XY robot runs at 12.5 % of its normal speed.

Figure 7 Safety devices

Locations of safety devices are depicted in [Figure 8](#) and [Figure 9](#).

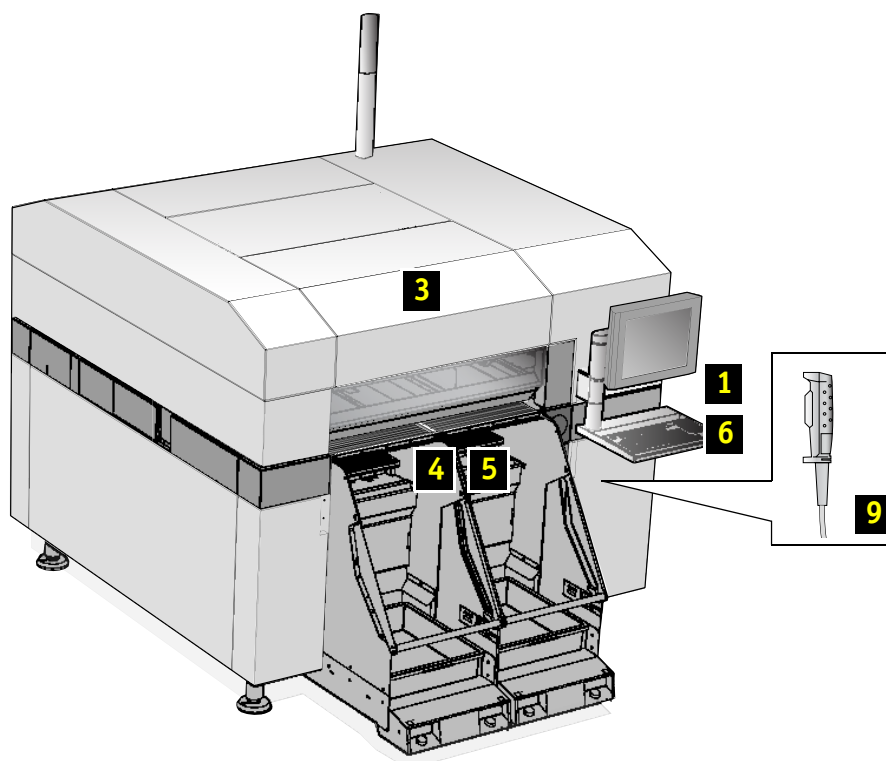


Figure 8 Location of safety devices, front

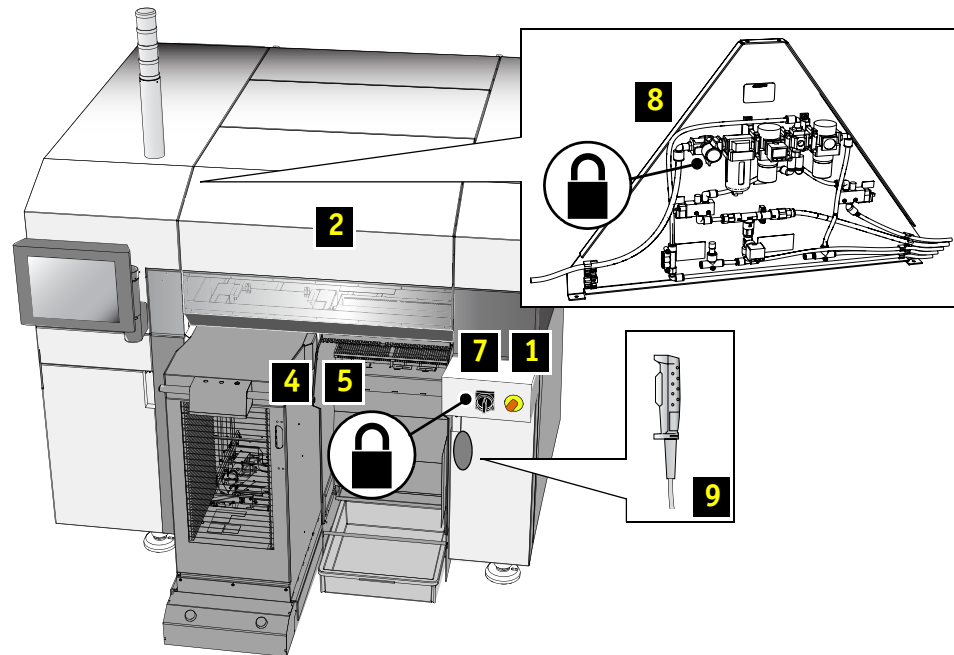


Figure 9 Location of safety devices, rear

Lock the electrical main switch (7) and the air main switch (8) by a padlock to avoid unauthorized use.

2.7.1 Enabling switch front/rear, usage



DANGER OF MOVING PARTS

Serious injury to fingers and body parts.
Keep fingers and body parts outside the machine.

Use the enabling switch (1) only as a hold-to-run device to suspend the safety function of the hood (2). Keep fingers and other body parts outside the machine when using the enabling switch (1).

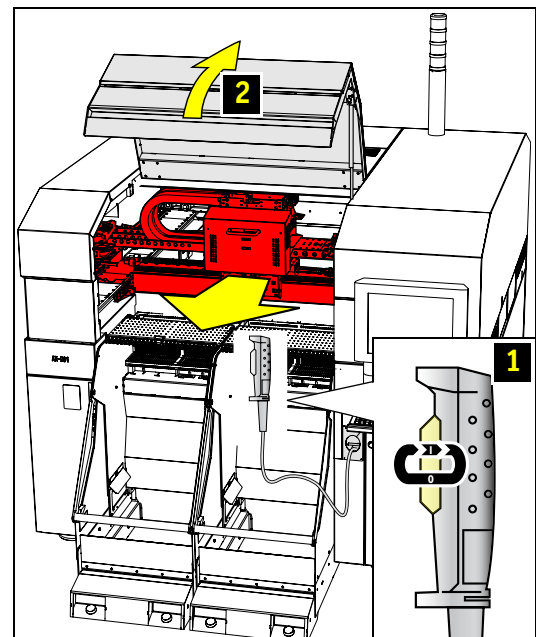
For teaching pick positions or for trouble shooting the machine can be operated with the hood (2) in opened position by using the enabling switch (1).

XY robot operation with open hood (2) is only possible when the enabling switch (1) is held in the middle position.

The XY robot (3) will run at 12.5 % of its normal speed.

Releasing the enabling switch (1) or squeezing the switch blocks further XY robot operation.

Each hood (front/rear) has its own enabling switch (front/rear).



2.8 Noise levels

Location	Noise level
Sound pressure at operator's position	≤ 72 dB(A)
Average environmental noise level during measurement	≤ 58 dB(A)

Figure 10 Noise levels

2.9 Emergency contact

In case assistance is needed during an emergency situation, contact the regional Assembléon organization.

Region	Number
Asia	+65-62-61-4611
America's	+1-800-474-4547
Europe	+31-20-5040679

Figure 11 Numbers

2.10 Liability

Assembléon will not be liable for any costs, damages or personal injuries if the machine is not used according to the safety rules given in this manual.
Instructions written in English are original instructions.
Instructions written in other languages are a translation of the original.

2.11 Recommended tools for working safely




Description	Picture	Application
1 Stepstool		Useful for smaller persons: reaching inside the machine or closing hoods.
2 Pallet truck		Lifting and moving of heavy modules.
3 Gloves		Skin protection during lubrication.

Figure 12 Recommended tools for working safely

CHAPTER 3 Installation

Use the table as guide line, see [3.1 Checklist installation](#) .

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3.1 Checklist installation

Subject	Reference information	Checked
Before installation		
Check if the site is prepared	See Pre-Installation Manual	
Unpacking and transportation		
Check if there is enough space to manoeuvre the machine (fork-lift truck)	3.3 Machine, transportation	
Remove all packing materials	3.2 Machine, unpacking	
Transportation to the site	3.3 Machine, transportation	
Positioning and adjustment		
Power supply adoptions	4.2 Mains supply, connecting	
Positioning the machine	3.4 Machine, positioning in the flow line	
Removing transport securities	3.5 Transport securities, removal	
Levelling the machine	3.6 Machine, levelling	
Anchoring the machine	3.7 Machine, anchoring (Seismic protection)	
Mounting accessories and options	3.8 Accessories and options, installing	
Connections to services		
Safety Instructions	CHAPTER 2 Safety	
Switching on and checking the mains	4.2 Mains supply, connecting	
External emergency circuit	4.1 Emergency circuit, external connecting	
Connect Compressed Air	4.3 Air supply, connecting	
Connect Vacuum air supply (optional)	4.4 Vacuum supply, connecting	
Communication		
SMEMA interface connections	5.2 SMEMA, connecting	
Network connections	5.3 External network, connecting	
Software Installation	CHAPTER 6 Software installation	
Final Testing		
Checks before operation	7.1 Checks before operation	
Putting into operation	7.2 Starting operation	
Performing the dry run test	7.3 Running in simulation mode	
Running the acceptance test	7.4 Acceptance test	

3.2 Machine, unpacking

Estimated time to complete [min.]: -
 Required special tools: Open end spanner 36mm, see [9.1.3.Setup tooling kit \(PA 2435/00\)](#)
 Required part(s) -

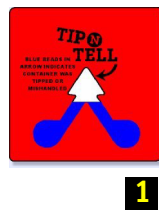
1. Prerequisites

- For unpacking is needed:
 - * a (automatic) screwdriver
 - * an open end spanner 36mm
- Do not use a crowbar to open the crate.
- Unpack the machine crate first because this contains the tools.



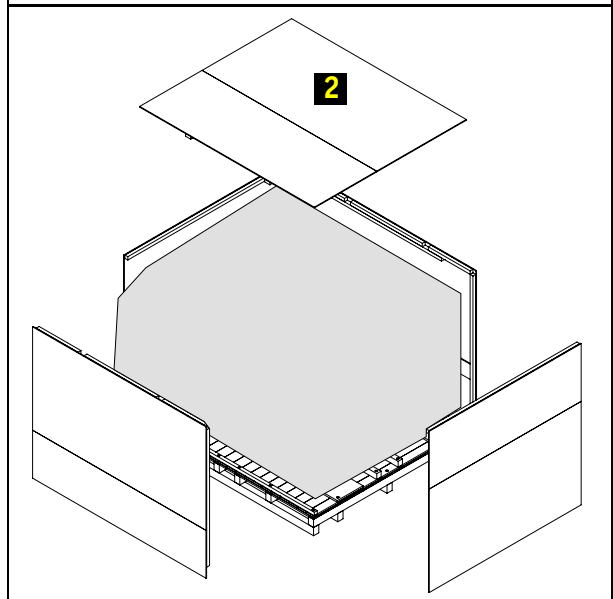
2. Check shipping indicators

- Check if crate has been tilted (1) too far.
 Call Assembléon if this indicator is activated.



3. Remove crate

- Remove first the top cover (2) and then the sides of the machine crate, as described in the unpacking instructions attached to the crate.

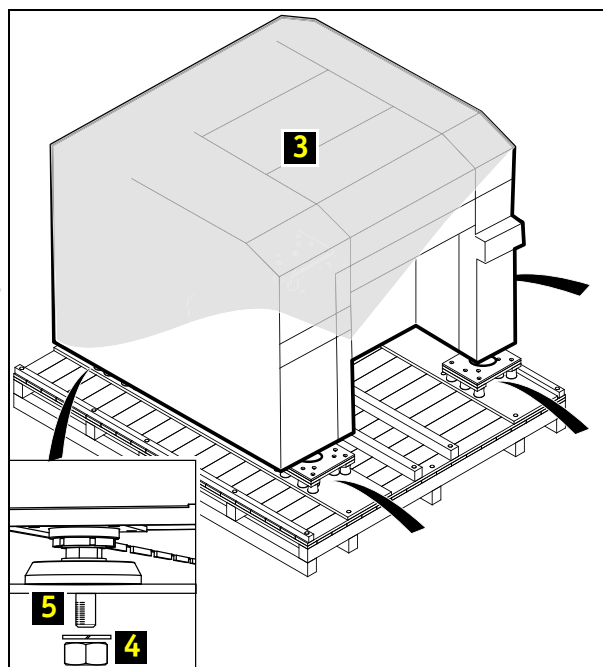


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4. Unpacking the machine

- Remove the seal (3) from the machine.
- Inspect the machine for transport damage.
- Remove the nuts (4) from the feet using a 36 mm open end spanner.
- Take the machine from the crate bottom with a forklift truck.
- Remove the studs (5) underneath the feet before putting the machine on the floor.

Note: Store crate and packing material for future transportation.



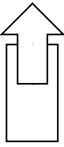
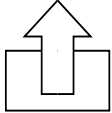

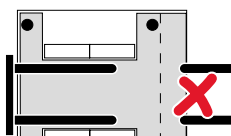
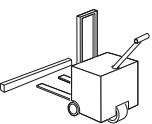
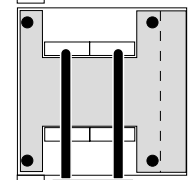
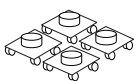
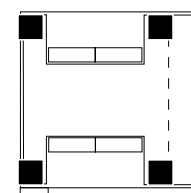
3.3 Machine, transportation

Estimated time to complete [min.]: -
 Required special tools. -
 Required part(s) -

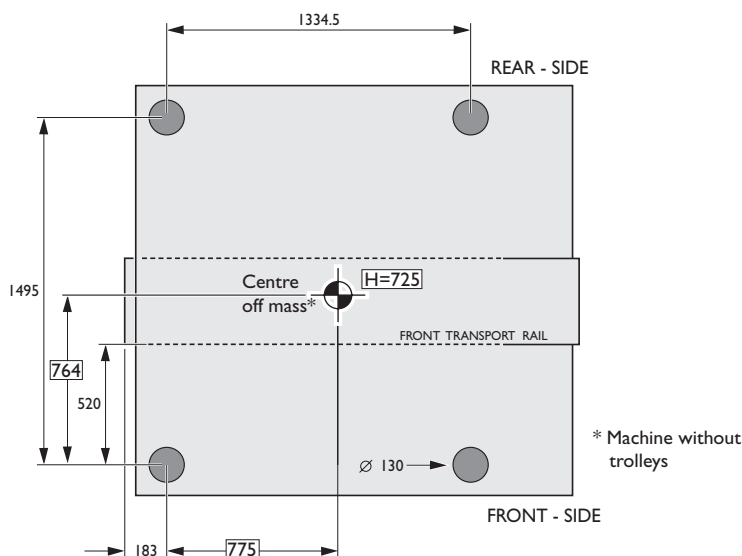
1. Transporting the machine

- Take the machine from the crate bottom with a forklift truck.
- For dimensions and weights of the un-crated machine, see [1.4 Machine dimensions and weights, crated and uncrated](#) .
- In the neighbourhood of the final installation site, the machine can be handled with a pallet car to bring the machine to its required position.

2. Ways of transportation

Transportation	Equipment	Fork position	Equipment specification
Crosswise or Lengthwise (In case of narrow passages)  	Forklift truck 		Lifting capacity >2500 kg, fork length > 1.5 m. Do not pick at control supply unit side.
	A pallet car 		
	Installation wheel set 		Special prepared set with foot guide area, for transportation by using hand power. A smooth floor without irregularities is necessary when using the installation wheel set.

3. Gravity point



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3.4 Machine, positioning in the flow line

Estimated time to complete [min.]:

Required special tools. Plumb line,

see [9.1.3 Setup tooling kit \(PA 2435/00\)](#)

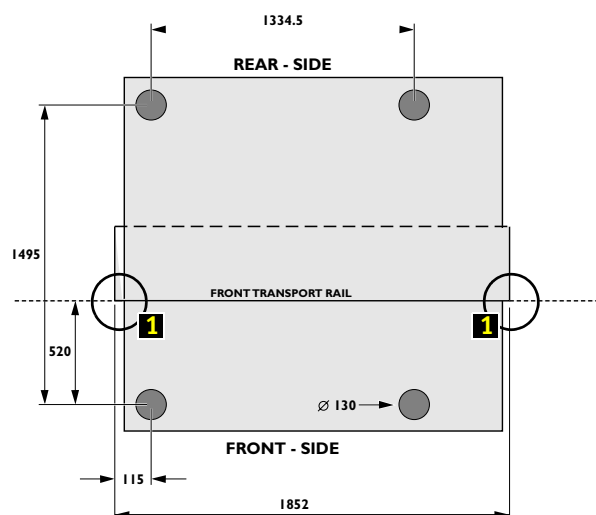
Required part(s)

1. Prerequisites

- Check transformer settings, see [4.2 Mains supply, connecting](#)

2. Positioning the machine

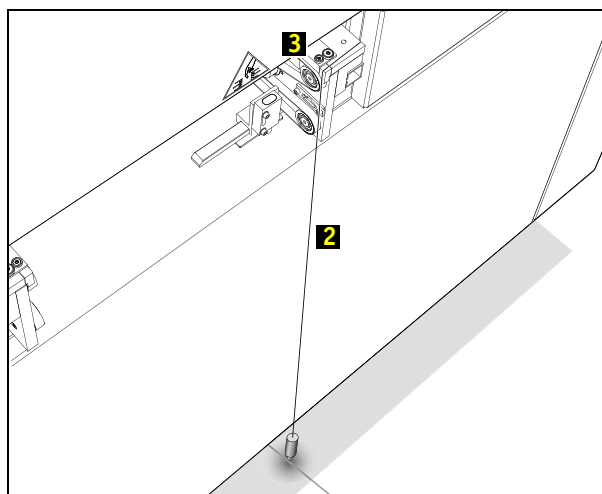
- Measure and mark the feet positions on the floor.
- If necessary the holes for seismic protection can be drilled now, see [3.7 Machine, anchoring \(Seismic protection\)](#).
- Before lowering the machine, the feet can be set to the desired board transport height, see [3.6 Machine, levelling](#)
- Position the machine with its feet above the marked position and lower the machine carefully.



3. Determine exact position of the machine

- Use a plumb line (2) for the correct position. Check at both sides (1) of the machine.
- Use the front transport rail (3) as reference.
- Determine the correct X position.

Note: The required distance between adjoining machines is 1 to 3 mm.



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3.5 Transport securities, removal

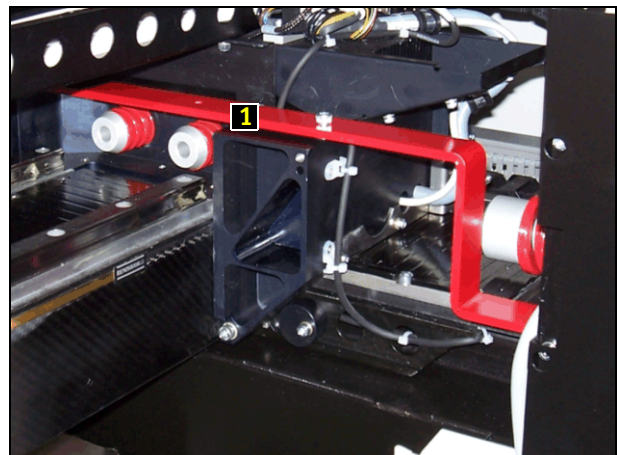
Estimated time to complete [min.]: 30
 Required special tools. 9.1.4 Recommended standard tools
 Required part(s) -

1. Removing

- Remove the transport securities, tie wraps and plastic safety wrap from:
 - * Monitor arm
 - * Lamp pole
 - * Key of the control supply unit
 - * Air connections for the feeders

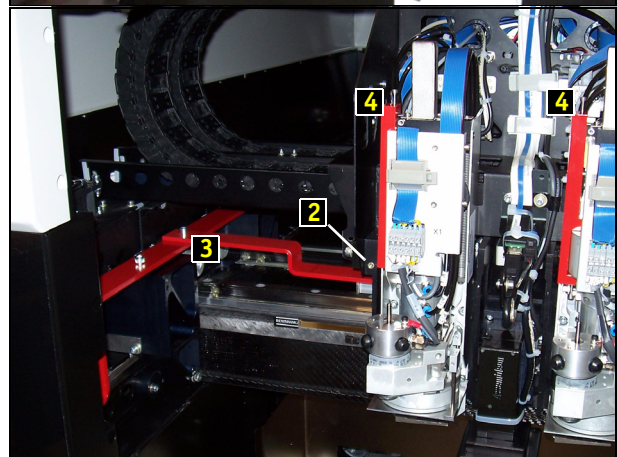
2. Remove transport protection Y2 axis

- Remove three M6x16 bolts and take bracket (1) off.



3. Remove transport protection X, Y1 axis and placement heads HA

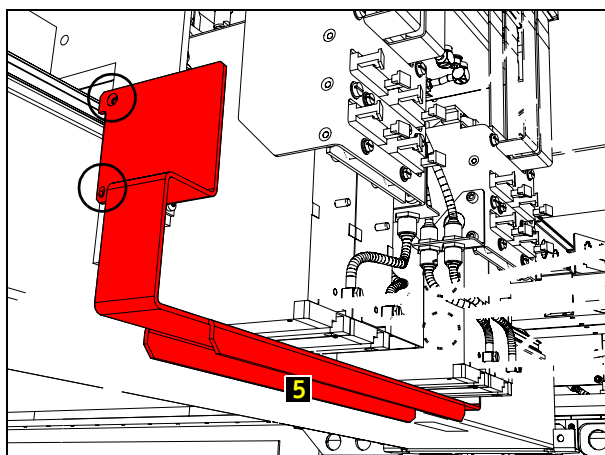
- Remove M6x16 bolt (2) holding the X carriage.
- Remove three M6x16 bolts and take bracket (3) off.
- Remove transport brackets (4) of placement heads HA.



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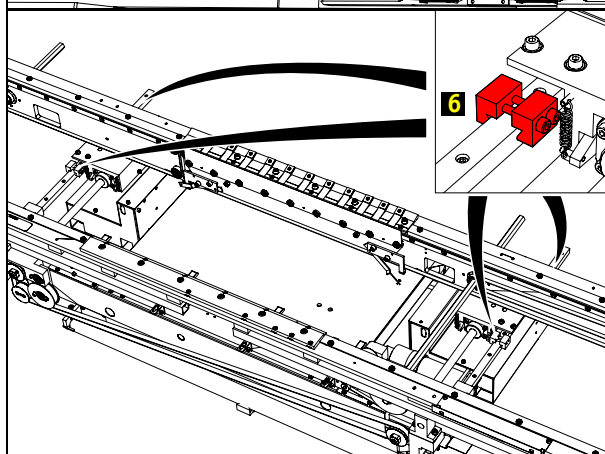
4. Remove transport protection on placement heads DV

- Remove four M3x20 bolts and remove transport bracket (5) of placement heads DV.



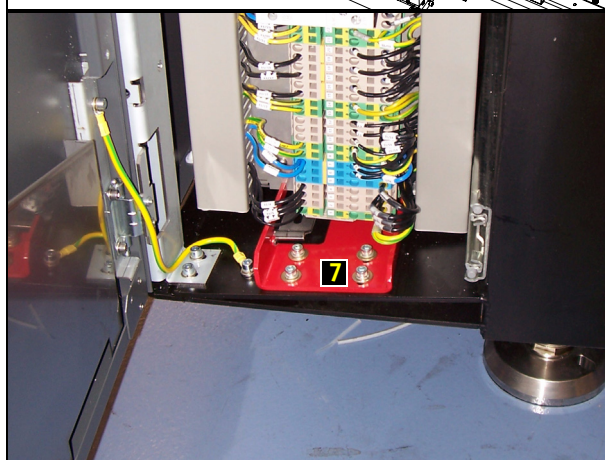
5. Remove transport brackets on board transport

- Loosen the bolts and remove the four brackets (6).



6. Remove transport protection control supply unit

- Remove the four M6x12 bolts and remove bracket (7).



7. Finalize

- Store all red transport securities for future transportation.

3.6 Machine, levelling

Estimated time to complete [min.]: 60

Required special tools. 9.1.3 Setup tooling kit (PA 2435/00)

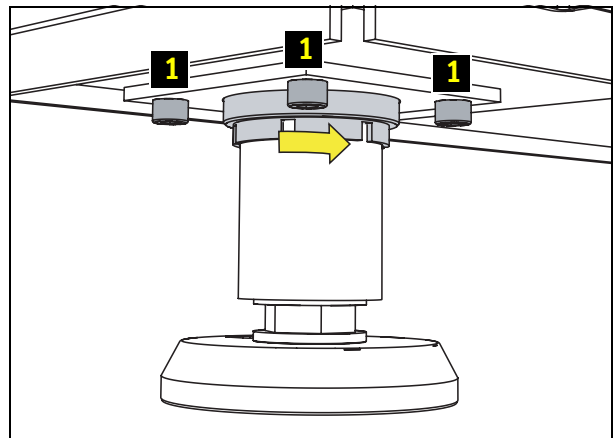
Required part(s) -



NOTE: Objective of this procedure is:
 1. First positioning the machine without tension and
 2. Secondary levelling within specification.

1. Release all feet

- Loosen the four bolts (1).
- Loosen the lock nut.

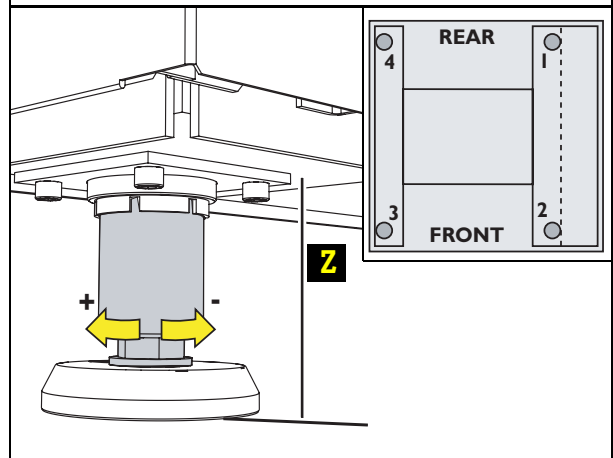


2. Adjust feet 1 and 2

- Determine the board transport height:
 - * In the flow line, or
 - * use table below:

Height	Board transport height	Corresponding height 'Z'
SMEMA	940 mm - 965 mm	135 - 160 mm
J.I.S.	885 mm - 915 mm	66 - 96 mm

- Adjust the feet 1 and 2 roughly.



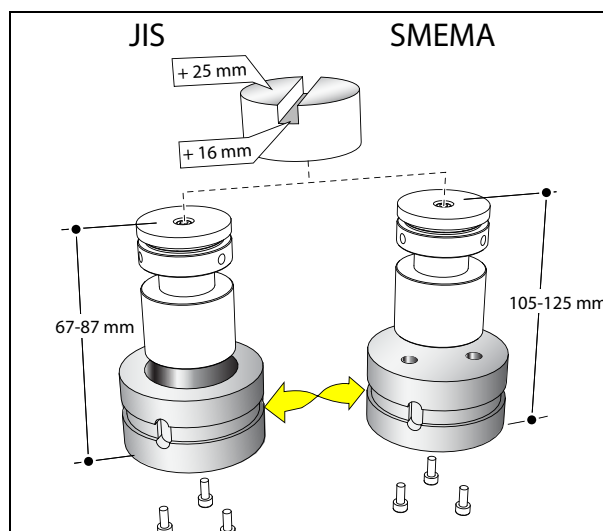
3. Position the machine in the flow line

- See 3.4 Machine, positioning in the flow line

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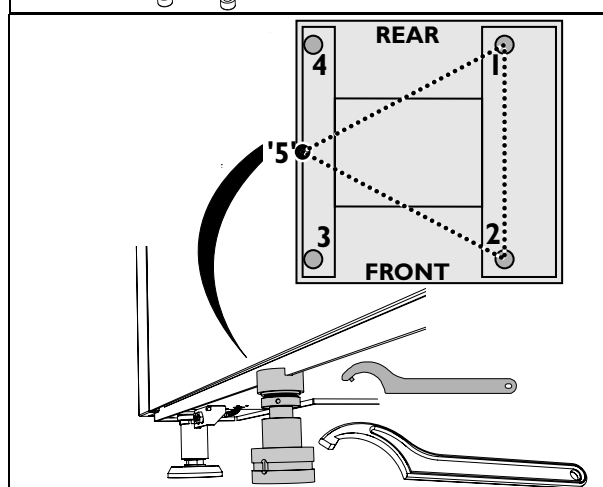
4. Prepare jig

- Prepare jig for JIS or SMEMA height levelling.



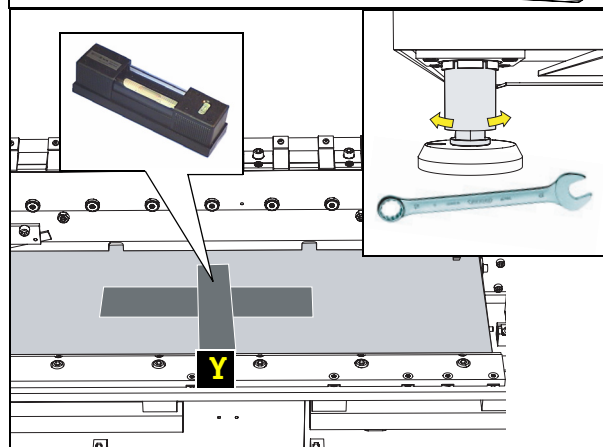
5. Position the jig

- Position a jig (being 'foot 5') in the middle of feet 3 and 4.
- Lift the machine, feet 3 and 4 are free from the floor.
- Drive in feet 3 and 4 slightly further up, gaining extra free space to the floor.



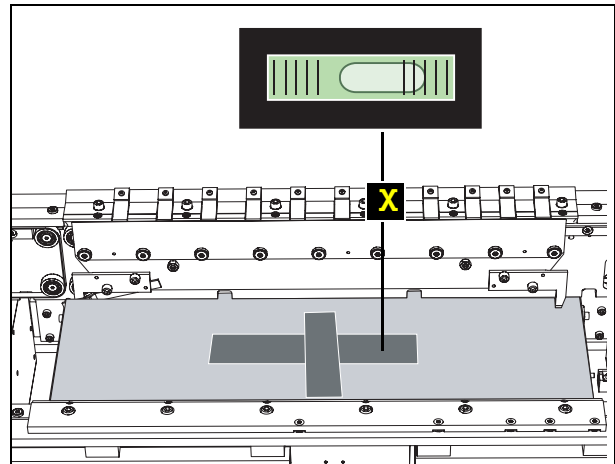
6. Level the machine in Y direction

- Open the protection hood.
- Position a spirit level in the middle off the lift table in Y direction.
- Check if the machine is in horizontal position.
- Adjust feet 1 and 2.
- Take care that feet 3 and 4 do not touch the floor during levelling.



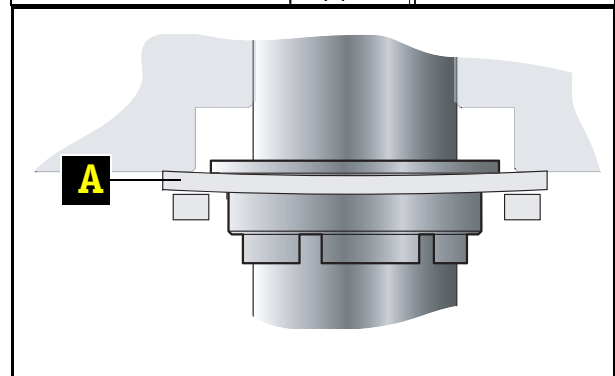
7. Level the machine in X direction

- Adjust in X direction with jig 5 until the spirit level shows 3 scales lower (on left side, seen from front).
- Take care that feet 3 and 4 do not touch the floor.



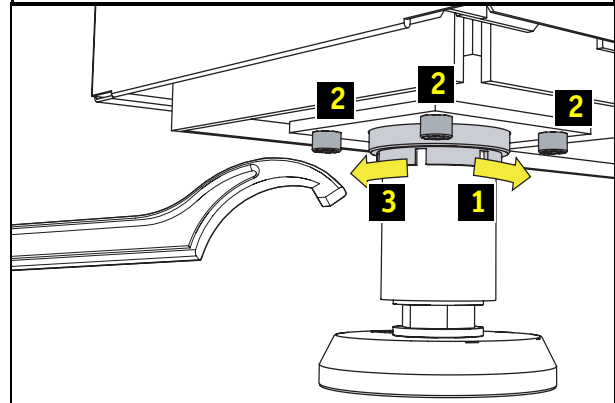
8. Blocking the feet

For a steady position of the machine during production, the feet must be blocked with the locking plate (A). The locking plate act as a large spring washer.



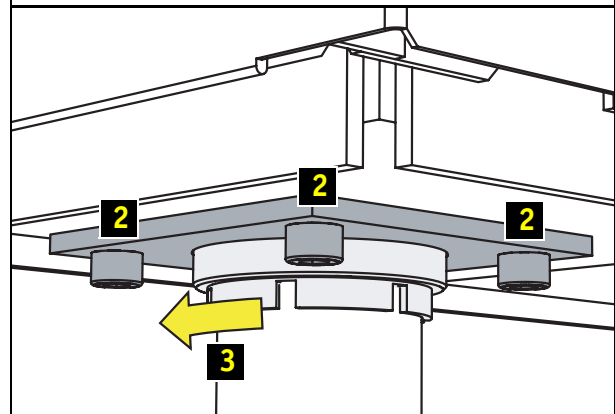
9. Secure feet 1 and 2

- Turn the lock nut up as far as possible (1).
- Hand tight the four bolts (2).
- Secure the lock nut (3) with the hook spanner.



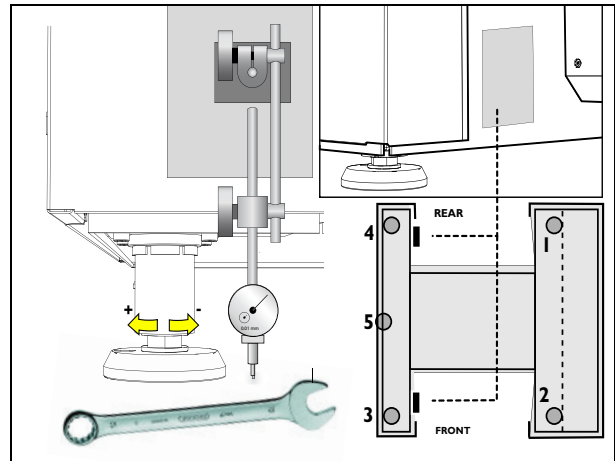
10. Block feet 1 and 2

- Release the four bolts (2).
- Move the lock nut (3) a half turn further down.
- Secure the four bolts (2) crosswise. Tightening torque 80 Nm.



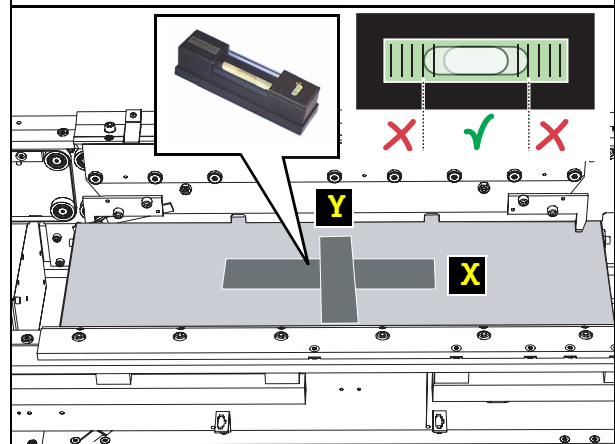
11. Level the machine in X direction

- Install two dial gauges (0.01mm) between the floor and machine at feet 3 and 4.
Apply a piece of paper to avoid scratches on the machine.
- Set both gauges halfway their measuring range, e.g. the small pointer on '25' and the big one on '0'.
- Turn both feet 3 and 4 until the corresponding dial gauge indicates 0.3 mm.
- Remove the jig (5).



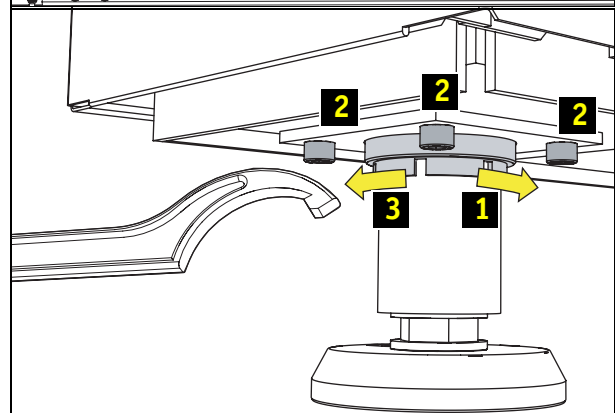
12. Final check

- Check if the machine is levelled in both X and Y direction (correct if necessary).
- If not within spec ($\pm 0.1\text{mm/m}$) go to step 5.



13. Secure feet 3 and 4

- Turn the lock nut up as far as possible (1).
- Secure the four bolts (2).
- Secure the lock nut (3) with the hook spanner.

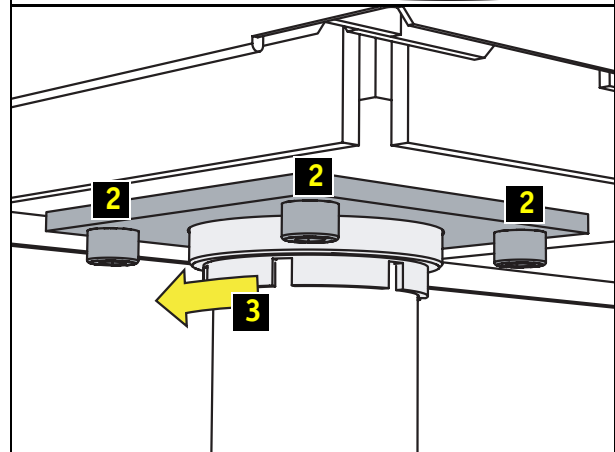


14. Block feet 3 and 4

- Release the four bolts (2).
- Move the lock nut (3) a half turn further down.
- Secure the four bolts (2) crosswise.
Tightening torque 80 Nm.

15. Finalize

- Remove the gauges.
- To comply with SEMI requirements the machine can be anchored to the floor, see [3.7 Machine, anchoring \(Seismic protection\)](#).



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3.7 Machine, anchoring (Seismic protection)

Estimated time to complete [min.]:

Required special tools.

Required part(s)

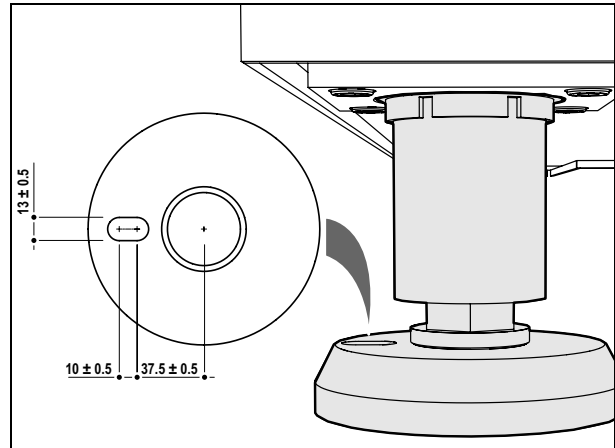


NOTE: For protection during an earth quake, the machine can be anchored to the floor. Anchoring the machine can be done in two different ways.

1. Anchoring the machine after levelling

Perform this procedure after placing and levelling the machine (in a flow line).

- Mark the holes in the feet with an e.g. felt-tip marker on the floor.
- Take the machine away to get access to the hole positions.
- Drill the holes and place the floor anchors or rawl bolts.
- Replace the machine.
- Check the levelling of the machine.
- Secure the machine by tightening the bolts or nuts.



2. Anchoring the machine before levelling

Perform this procedure before placing and levelling the machine (in a flow line).

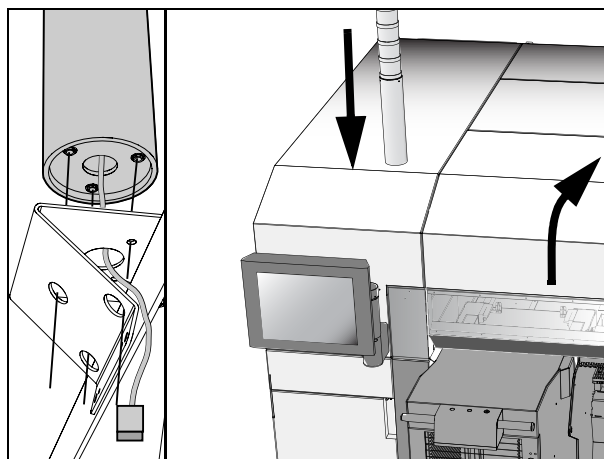
- Define the hole positions, see [3.4 Machine, positioning in the flow line](#)
- Drill the holes and place the floor anchors or rawl bolts.
- Place the machine.
- Level the machine, see [3.6 Machine, levelling](#) .
- Secure the machine by tightening the bolts or nuts.

3.8 Accessories and options, installing

Estimated time to complete [min.]:	-
Required special tools:	9.1.3 Setup tooling kit (PA 2435/00)
Required part(s)	-

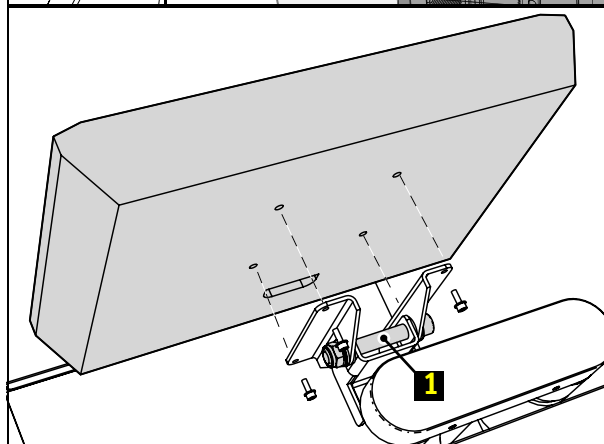
1. Mounting the lamp post

- Open the rear cover.
- Position the lamp post on top of the protection hood.
- Lead the cable through the hole.
Mount it with 3 screws from underneath.
Use torque screw driver with extended bit holder of setup tooling kit.
Connect the connector



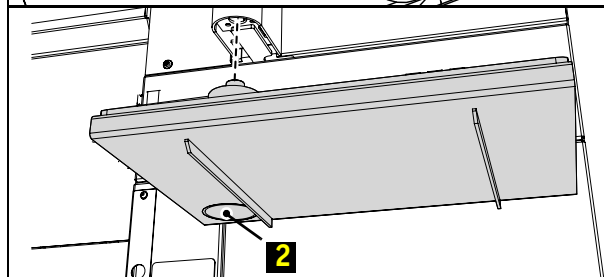
2. Mounting touch screen(s)

- Loosen hinge bolt (1).
- Mount the touch screen(s) on the support.
- Secure hinge bolt (1).
- Connect the mains and video cable to the monitor, RS232.



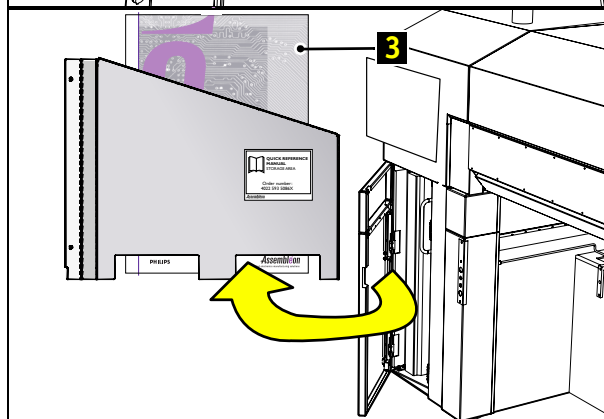
3. Mounting the keyboard stand

- Install the keyboard stand from underneath (2) (3 bolts). Use torque screw driver with extended bit holder of setup tooling kit.
- Position and connect the keyboard.



4. On board documentation

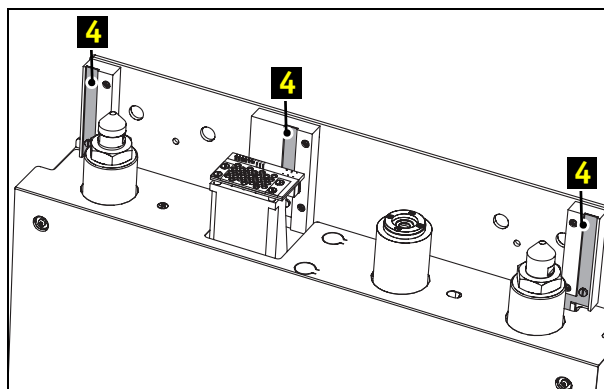
- Check if the Quick Reference Manual (3) is available in the storage area of the rear door.
- If not: Take the Quick Reference Manual out of the documentation set (supplied with the machine), and put it in the storage area of the rear door.



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5. Clean contact plates for trolley

- Clean the three contact plates (4) on each trolley lift.



CHAPTER 4 Connections to services

4.1 Emergency circuit, external connecting

1. Preparation

- Power down the machine.
- Open the front door of the machine.

2. Remove panel

- Remove the two bolts.
- Slide out the panel.
- Disconnect the connectors.

3. Make the interconnection board accessible

- Remove the bolts.
- Turn the bracket with board.

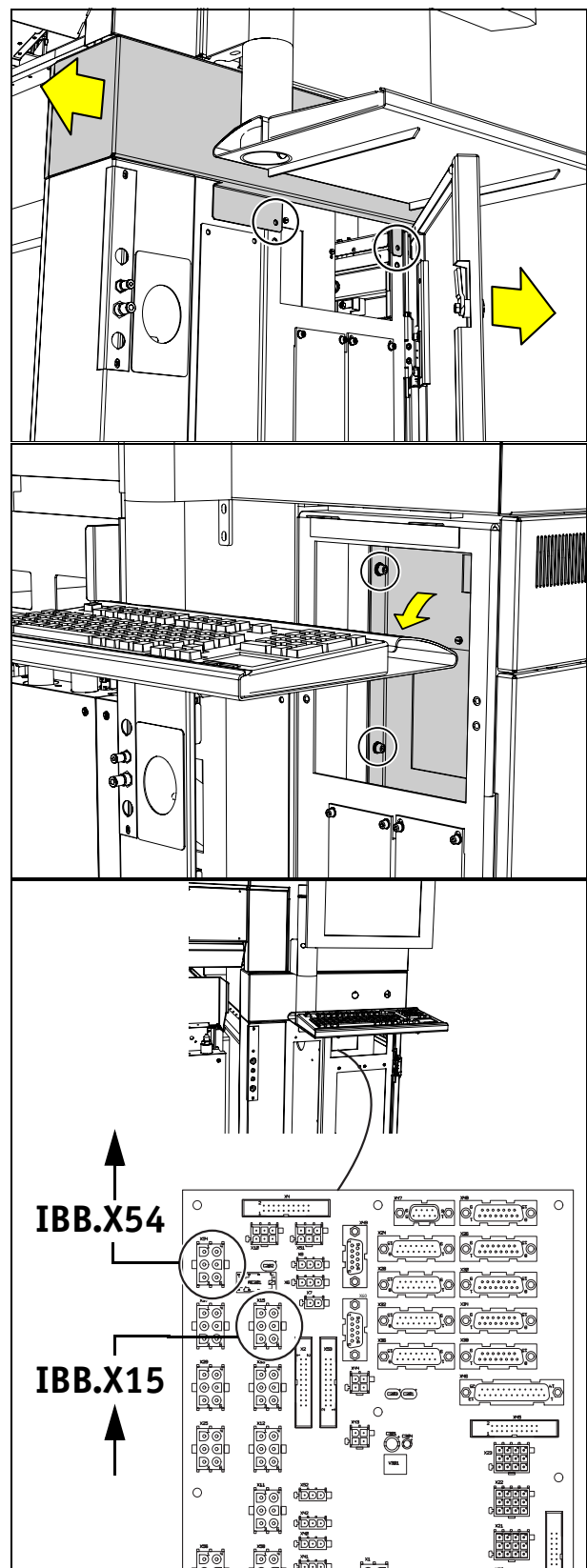
4. Connecting an external emergency switch

An external emergency switch can be connected to X15 on interconnection board base, see [4.5.Power and safety circuits](#).

Note: The circuit must consist of one or more mechanical interrupt contacts.

5. Switching an external safety device

To switch an external safety device connector X54 on the interconnection board base can be used.



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4.2 Mains supply, connecting

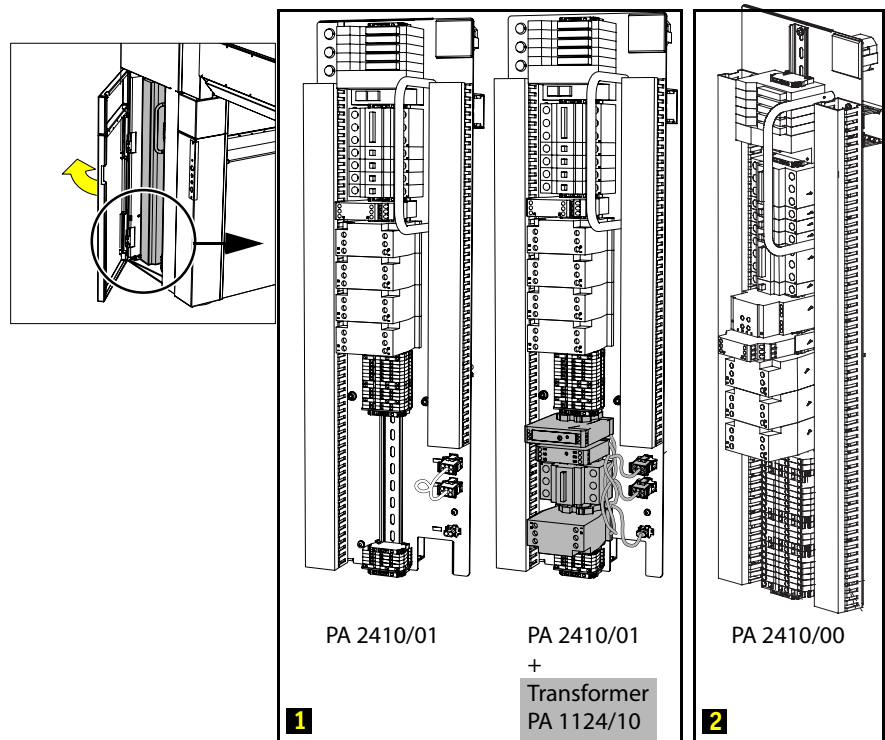


Figure 13 Overview

1. Machine **without** standard transformer.
The transformer (PA 1124/10) can be installed as an option.
See [4.2.1 Connecting the machine to the mains, PA 2410/01](#)
2. Machine **with** standard transformer.
See [4.2.2 Connecting the machine to the mains, PA 2410/00](#)

4.2.1 Connecting the machine to the mains, PA 2410/01

Estimated time to complete [min.]: -
 Required special tools. Panel key [9.1.3 Setup tooling kit \(PA 2435/00\)](#)
 Required part(s) -



DANGER, HIGH VOLTAGE PRESENT AFTER MAIN SWITCH OFF

Contact may cause electric shock or burn.
 Turn off and lock factory fuses that supply power to the machine.



NOTE: Connecting to the mains is only allowed by competent qualified personnel.

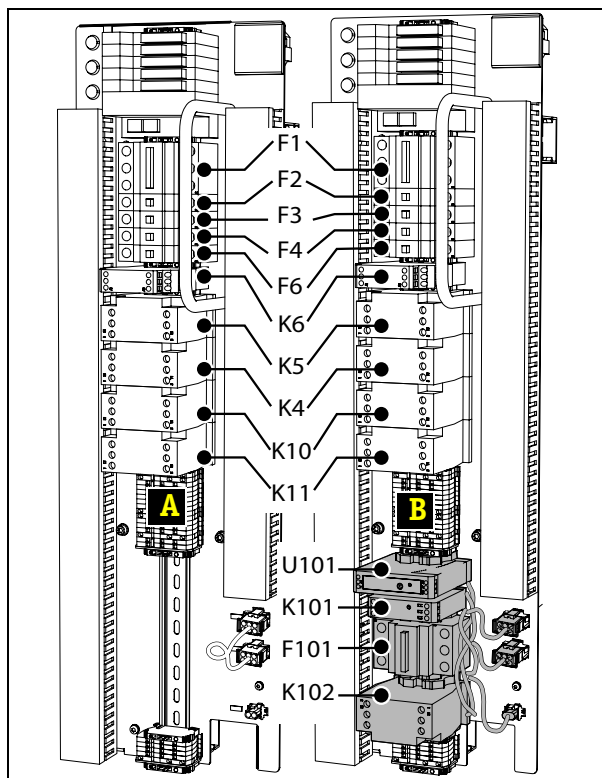
1. Specifications

	Without transformer	With transformer
Voltage configuration	3-phases, Neutral and ground	3-phases and ground
Frequency	50 - 60 Hz	50 - 60 Hz
Frequency stability	± 2%	± 2%
Maximum power consumption	7 kVA	7 kVA
Nominal mains voltage ± 10% (between phases)	400 Volts	208 230 400 480 Volts
Corresponding full load current	10 Amp.	19 18 10 8 Amp.
Corresponding external fuse	16 Amp.	20 20 16 16 Amp.
External fuse type	Slow-blow "D-type"	Slow-blow "D-type"
Inrush current	≤ 150 Amp. (5 msec)	≤ 150 Amp. (5 msec)
Power factor	≥ 0.85	≥ 0.85
Line voltage fluctuation	According to EN 60204 and IEC 60204: Voltage Steady state voltage: 0.9 ... 1.1 of nominal voltage. Frequency 0.99 ... 1.01 of nominal frequency continuously; 0.98 ... 1.02 short time. Harmonics Harmonic distortion not to exceed 10 % of the total r.m.s. voltage between live conductors for the sum of the second through to the fifth harmonic. An additional 2 % of the total r.m.s. voltage between live conductors for the sum of the sixth through to the 30th harmonic is permissible. Voltage unbalance Neither the voltage of the negative sequence component nor the voltage of the zero sequence component in three-phase supplies shall exceed 2 % of the positive sequence component. Voltage interruption Supply interrupted or at zero voltage for not more than 3 ms at any random time in the supply cycle. There shall be more than 1 s between successive interruptions. Voltage dips Voltage dips shall not exceed 20 % of the peak voltage of the supply for more than one cycle. There shall be more than 1 s between successive dips.	
Mains cable	Connection to facility power supply system shall be made by a 4 or 5 -core cable type and cross-section according to appropriate international standard or local regulatory requirement. E.g. AWG 12.	

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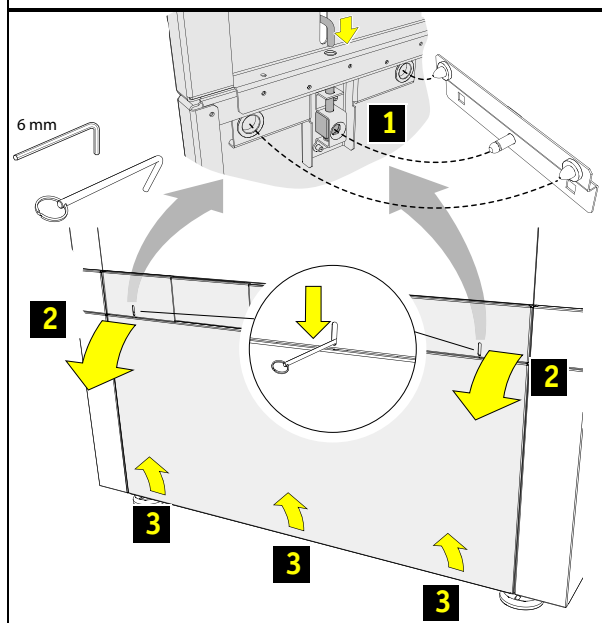
2. Precautions

- Switch off the electrical main switch.
- Ensure that the mains supply to the machine is inactive by removing the relevant factory fuses.
- **Machine without transformer (A):**
 - * Open all circuit breakers: F1, F2, F3, F4 and F6.
 - * Continue with step 5. [Remove the main switch cover](#) .
- **Machine with transformer (B):**
 - * Open all circuit breakers: F101, F1, F2, F3, F4 and F6.
 - * Continue with step 3. [Remove panel at the left side of the base](#)



3. Remove panel at the left side of the base

- Release both catches (1).
Use the panel key from the setup tooling kit, or use a 6 mm Allen key.
- Move the panel forward (2) and take it from the three lower fixing points (3).

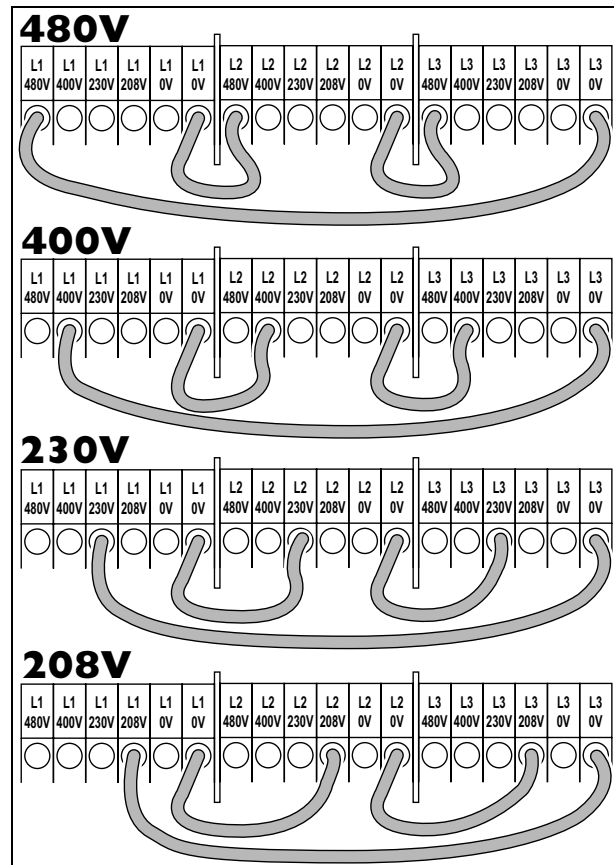


4. Adapting machine to mains voltage

- Measure the factory voltage between the phase L1, L2, L3 and change the settings of the machine if necessary.

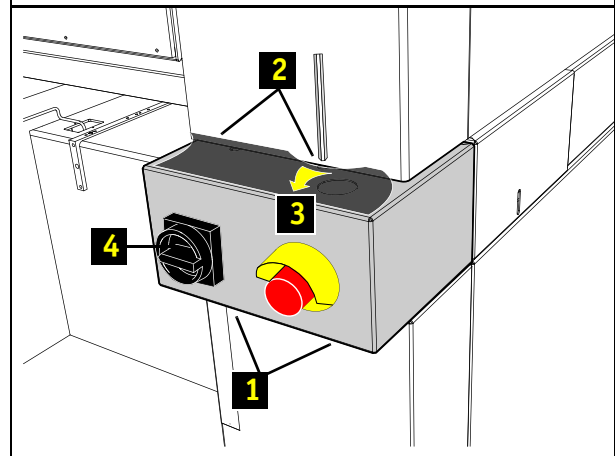
Note: If the measured voltage differs more than 10% of one of the values listed, then the customer must take measures to adapt the local power supply to the required configuration.

- Mount panel at the left side of the base.



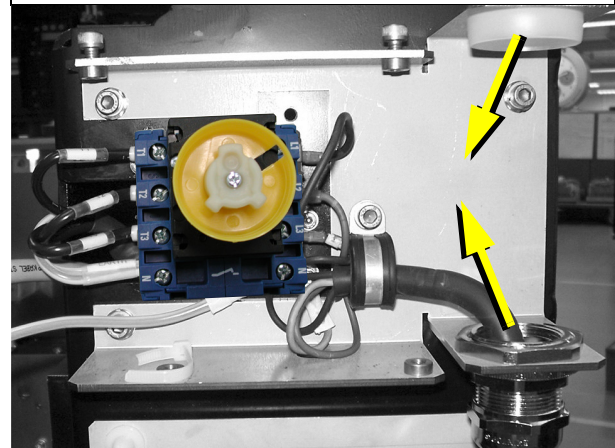
5. Remove the main switch cover

- Remove the two bolts (1) from underneath.
- Loosen the two bolts (2) on top, turn over the cover (3).
- Turn the main switch (4) in the 'OFF' position and put the cover aside.



6. Leading the power supply cable

- Route the mains cable through a separate metal duct or pipe. This duct or pipe must be grounded, to avoid EMI (electromagnetic interference) problems.
- Safety: Do not route signal cables through this duct or pipe.
- Lead the power supply cable through the cover (bottom/top).



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7. Connect the power supply cable

- Tightening torque 1.2 - 1.6 Nm.

Cable	Power supply	
Ground	ground screw	
Neutral	N	Only for machines without transformer
Phase 1	L1	
Phase 2	L2	
Phase 3	L3	

- Install the main switch cover.

8. Switching on and checking the mains

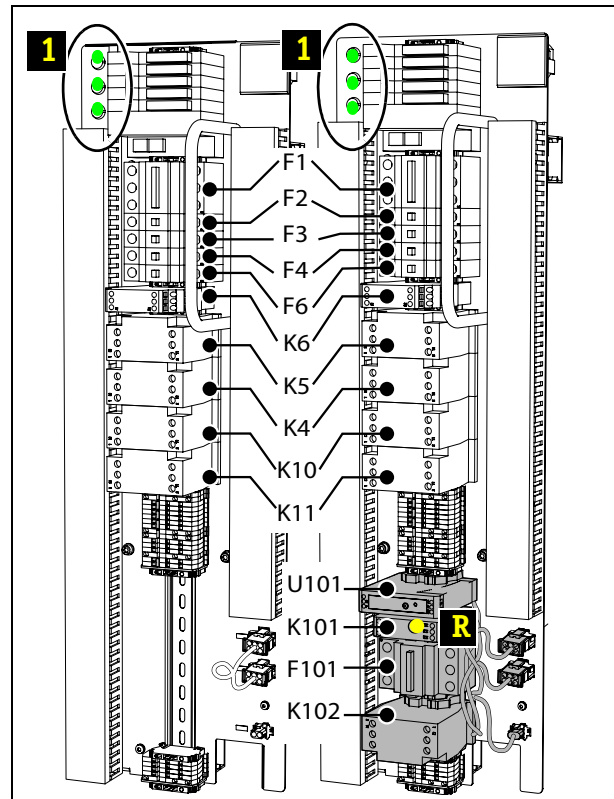
- Check if the factory fuses are slow blow before connecting the machine to the mains. These fuses must not be loaded by other heavy consumption.
- Be sure the main power is still off.
- Switch on circuit breaker (F101 and) F1 in the control supply.
- Set the main switch to on.
- Lamps on control supply must be on (1).
- Machines with transformer, go to step 9. [Check status phase guard relay \(K101\)](#)
- Switch on circuit breakers (F2, F3, F4 and F6) one by one.

9. Check status phase guard relay (K101)

Only valid for machines with transformer.

Note: The phase detection LED (R) on the phase guard relay must be on, indicating that the three phases are present.

- Switch on circuit breakers (F2, F3, F4 and F6) one by one.



4.2.2 Connecting the machine to the mains, PA 2410/00

Estimated time to complete [min.]: -
 Required special tools. Panel key [9.1.3 Setup tooling kit \(PA 2435/00\)](#)
 Required part(s) -



DANGER, HIGH VOLTAGE PRESENT AFTER MAIN SWITCH OFF

Contact may cause electric shock or burn.
 Turn off and lock factory fuses that supply power to the machine.



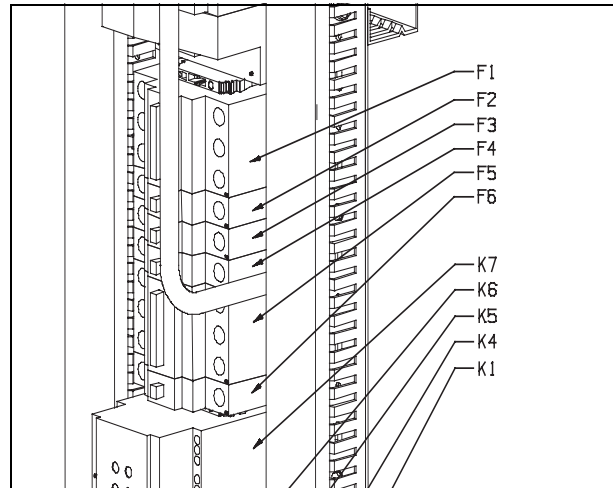
NOTE: Connecting to the mains is only allowed by competent qualified personnel.

AX-201	
Voltage configuration	3-phases and ground
Frequency	50 - 60 Hz
Frequency stability	± 2%
Maximum power consumption	7 kVA
Nominal mains voltage ± 10% (between phases)	208 230 400 480 Volts
Corresponding full load current	19 18 10 8 Amp.
Corresponding external fuse	20 20 16 16 Amp.
External fuse type	Slow-blow "D-type"
Inrush current	≤ 150 Amp. (5 msec)
Power factor	≥ 0.85
Line voltage fluctuation	<p>According to EN 60204 and IEC 60204:</p> <p>Voltage Steady state voltage: 0.9 ... 1.1 of nominal voltage.</p> <p>Frequency 0.99 ... 1.01 of nominal frequency continuously; 0.98 ... 1.02 short time.</p> <p>Harmonics Harmonic distortion not to exceed 10 % of the total r.m.s. voltage between live conductors for the sum of the second through to the fifth harmonic. An additional 2 % of the total r.m.s. voltage between live conductors for the sum of the sixth through to the 30th harmonic is permissible.</p> <p>Voltage unbalance Neither the voltage of the negative sequence component nor the voltage of the zero sequence component in three-phase supplies shall exceed 2 % of the positive sequence component.</p> <p>Voltage interruption Supply interrupted or at zero voltage for not more than 3 ms at any random time in the supply cycle. There shall be more than 1 s between successive interruptions.</p> <p>Voltage dips Voltage dips shall not exceed 20 % of the peak voltage of the supply for more than one cycle. There shall be more than 1 s between successive dips.</p>
Mains cable	Connection to facility power supply system shall be made by a 4-core cable type and cross-section according to appropriate international standard or local regulatory requirement. E.g. AWG 12.

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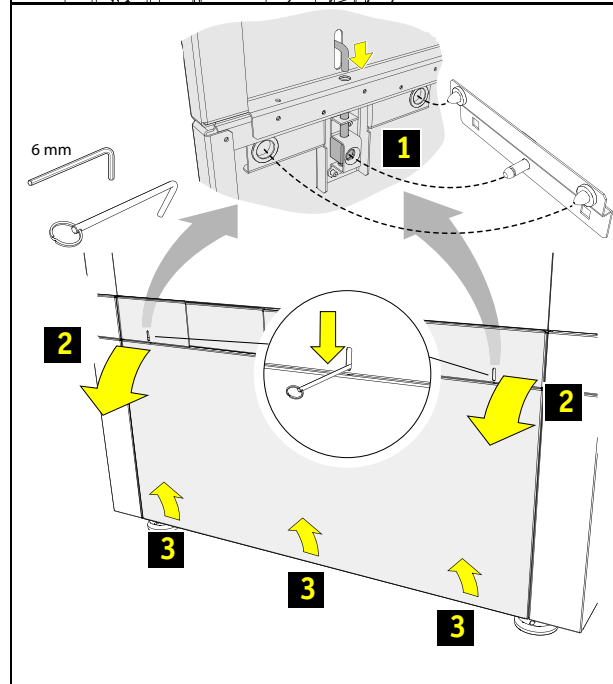
1. Precautions

- Switch off the electrical main switch.
- Ensure that the mains supply to the machine is inactive by removing the relevant factory fuses.
- Open all circuit breakers: F1, F2, F3, F4, F5 and F6.



2. Remove panel at the left side of the base

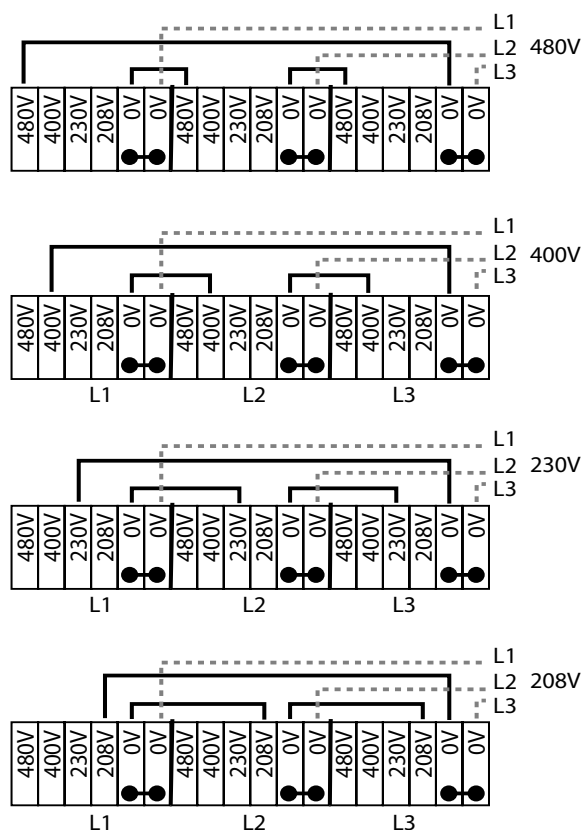
- Release both catches (1).
Use the panel key from the setup tooling kit, or use a 6 mm Allen key.
- Move the panel forward (2) and take it from the three lower fixating points (3).



3. Adapting machine to mains voltage

- Measure the factory voltage between the phase L1, L2, L3 and change the settings of the machine if necessary.
- Check and change the interconnections of the transformer if necessary, see step 4.

Note: If the measured voltage differs more than 10% of one of the values listed, then the customer must take measures to adapt the local power supply to the required configuration.



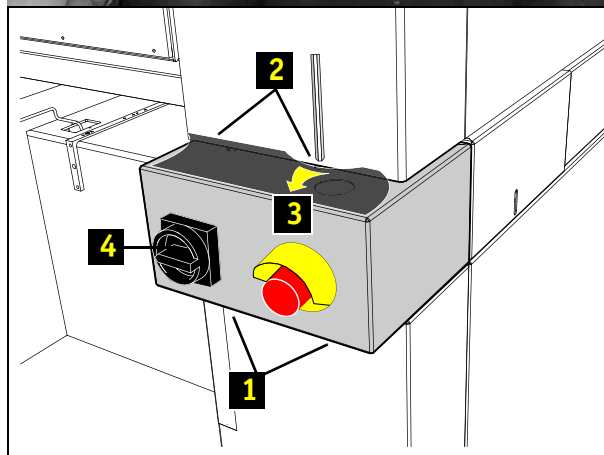
4. Setting the transformer

- See step 3 for the settings.



5. Remove the mains switch cover

- Remove the two bolts (1) from underneath.
- Loosen the two bolts (2) on top, turn over the cover (3).
- Turn the mains switch (4) in the 'OFF' position and put the cover aside.



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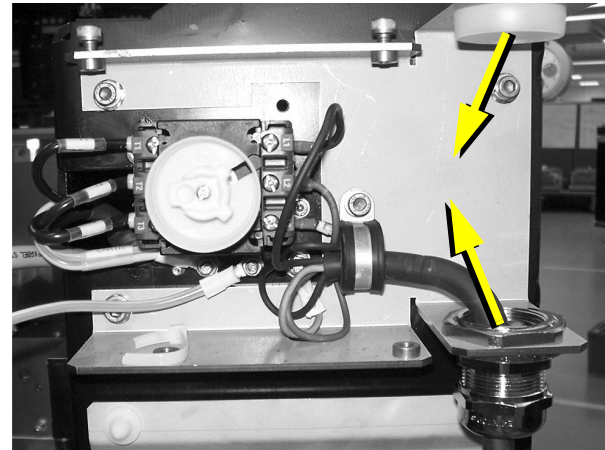
6. Leading the power supply cable

- Route the mains cable (4 x 2.5 mm² max., diameter max. 16 mm) through a separate metal duct or pipe. This duct or pipe must be grounded, to avoid EMI (electromagnetic interference) problems.
- Safety: Do not route signal cables through this duct or pipe.
- Lead the power supply cable through the cover (bottom/top).

7. Mounting the power supply cable

- Tightening torque 1.2 - 1.6 Nm

Cable	Power supply
Ground	ground screw
Phase 1	L1
Phase 2	L2
Phase 3	L3

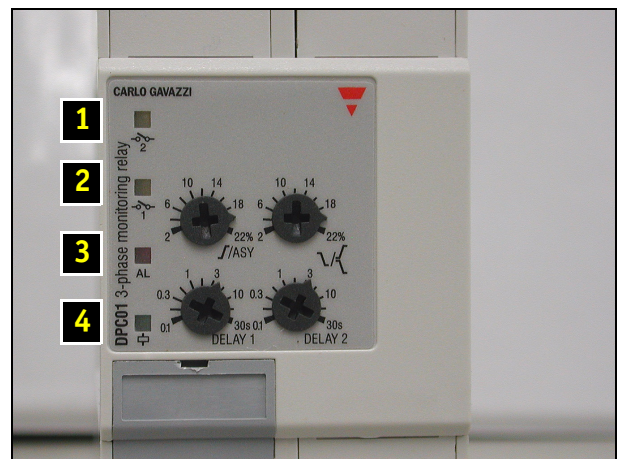


8. Switching on and checking the mains

- Check if the factory fuses are 16A slow blow before connecting the machine to the mains. These fuses must not be loaded by other heavy consumption.
- Be sure the main power is still off.
- Measure the power between L1, L2 and L3.
- Switch on circuit breaker F1 and F5 in the control supply.
- Set the main switch to on.
- LED 1,2 and 4 must be on.

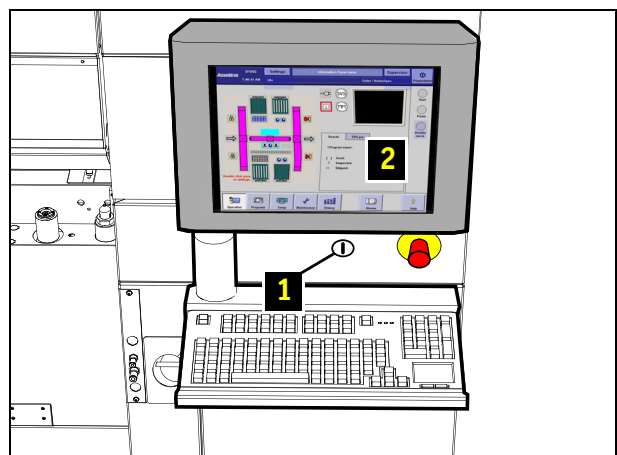
Note: The phase-detection LED (3) on the phase guard relay must be off, indicating that the three phases are present.

- If the LED (3) is on, interchange two phases on the connectors L1 to L3 at the electrical main switch, see step 7.
- Mount the mains switch cover, see step 5.
- Switch on circuit breakers (F2, F3, F4 and F6) one by one.



9. Start up the machine

- Go to the front of the machine.
- Push the start button (1).
- Wait until the main screen (2) appears.



4.3 Air supply, connecting

Estimated time to complete [min.]: -
 Required special tools. -
 Required part(s) -

1. Specifications

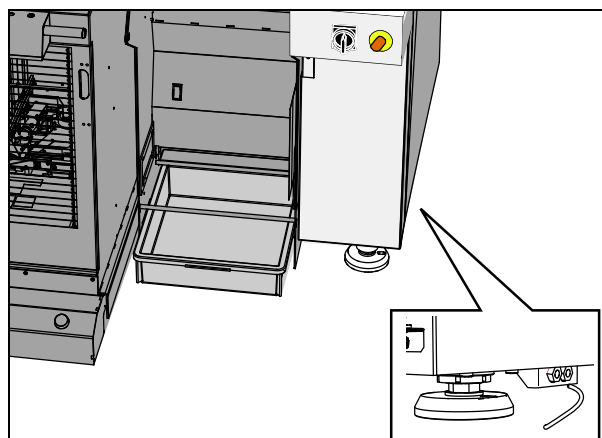
Air supply	6-8 Bar, to be maintained at maximum air consumption.
Air consumption	≤ 190 NI/min. ≤ 290 NI/min. (incl. bulk feeders)
Max. oil content	< 0.1 mg/m ³
Dew point	< 2°C at 7 bar < 4°C at 7.2 bar
Dust particles size	< 10 µm

2. Recommendations

- Compressed air supply can be delivered by metal pipes or hoses.
- To prevent transfer of vibration, it is recommended to connect a piece of flexible hose between the fixed pipe and the system.

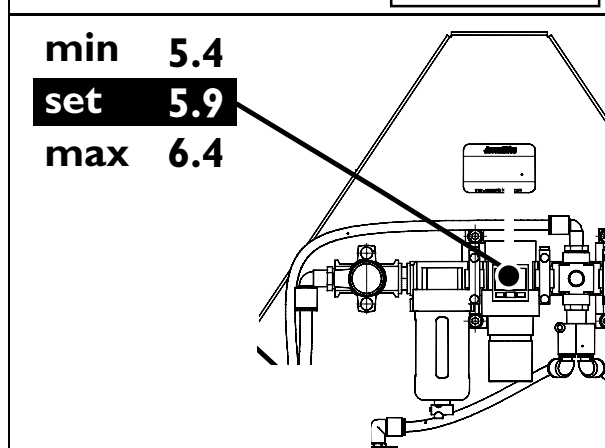
3. Connect the air supply

- Fit a hose pillar or coupling to the bulk head coupling (SCM-G¹/₄).
- Connect the hose to the hose pillar or coupling.
- Turn the compressed air supply on.



4. Check and adjust digital pressure switch

- Check/adjust the upper/lower pressure limits of the digital pressure switch, see Service Manual AX-201, chapter B6.



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4.4 Vacuum supply, connecting

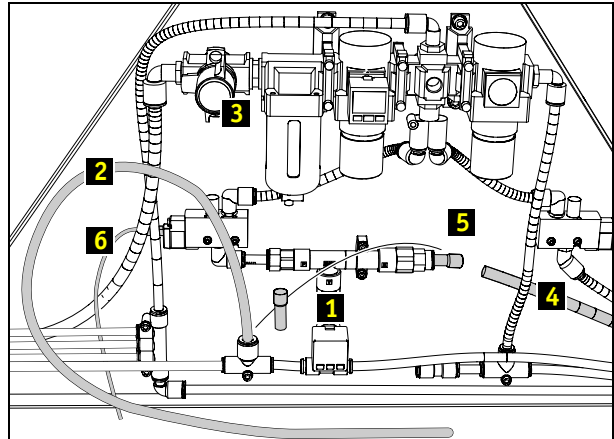
Estimated time to complete [min.]: -
 Required special tools. -
 Required part(s) -

1. Recommendations

Note: The machine is equipped with a venturi system (1) generating vacuum for the placement heads HA. As an alternative the machine can be connected to the factory vacuum supply (2).

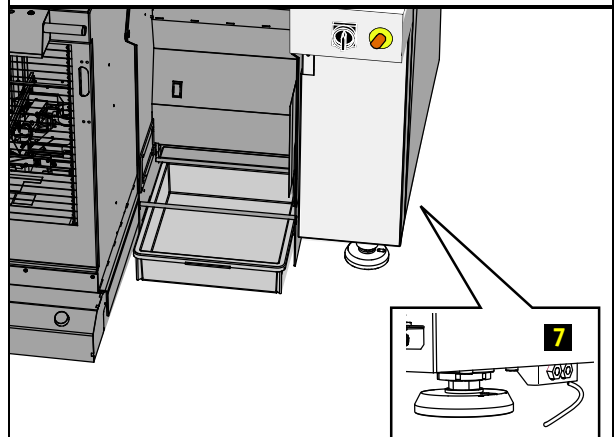
2. Change to factory vacuum supply

- Close air main switch (3).
- Disconnect exhaust hose (4).
- Transfer the plug (5) to the venturi.
- Connect the vacuum hose (2).
- Disconnect connector (6) from the venturi system.



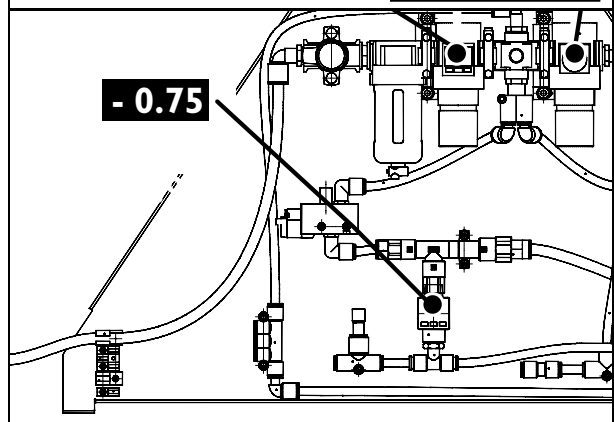
3. Connect machine to factory vacuum supply

- Connect the vacuum supply by metal pipes or hoses (PU-6) to the machine (7).
- When using metal pipes: Insert a piece of flexible hose, to prevent electrical earth loops and transfer of vibration.



4. Check and adjust digital vacuum switch

- Open air main switch (3).
- The factory vacuum supply pressure must be **-0.85 ± 0.1 Bar**.
- Check/adjust the upper/lower pressure limits of the digital vacuum switch, see Service Manual, chapter B6.



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4.5 Power and safety circuits

4.5.1 Power and safety circuit PA 2410/01

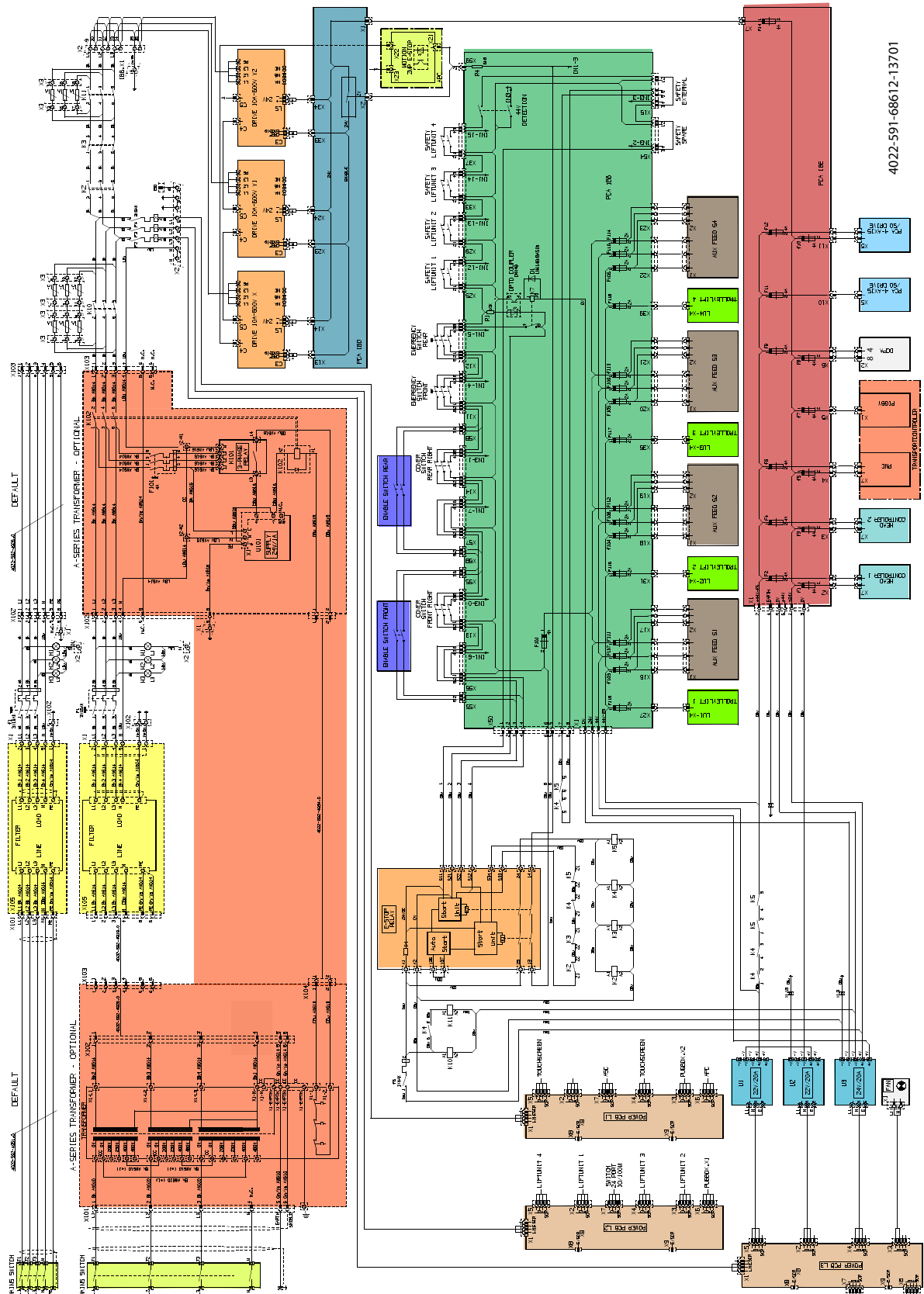


Figure 14 Emergency and safety circuit PA 2410/01

4.5.2 Power and safety circuit PA 2410/00

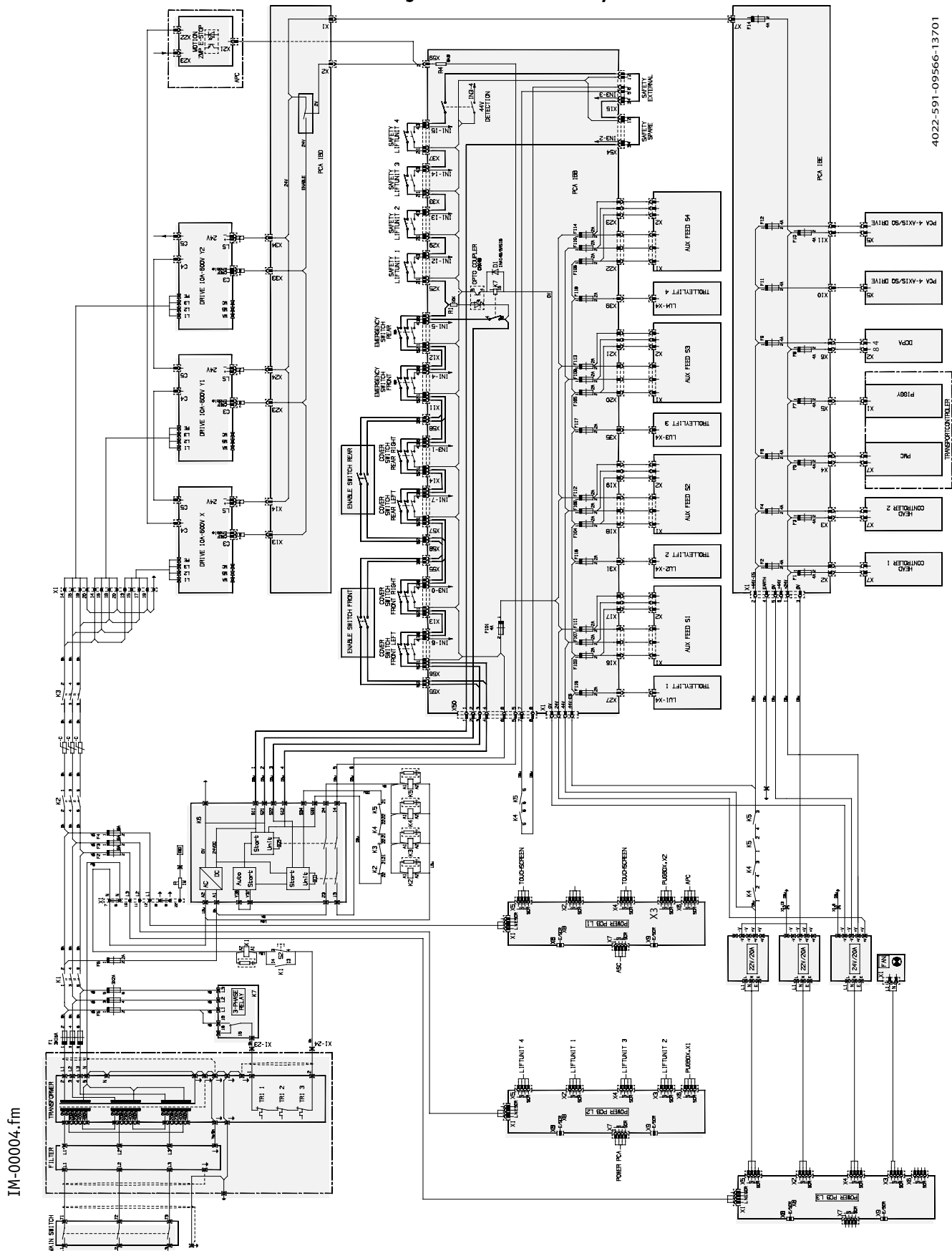


Figure 15 Emergency and safety circuit PA 2410/00

CHAPTER 5 Communication

5.1 SMEMA interfacing

To let the machine work with adjacent equipment in a flow line, it complies with the SMEMA standards. To sequence boards properly from machine to machine two signal lines are used: "Busy" and "Board available".

5.1.1 SMEMA, interface cable

One SMEMA interface cable (length 2000 mm) is supplied with the machine.

Cable specifications:

- 4 wires.
- Cable connector for both ends consisting of the following parts per connector:
 - CPC 14p connector pin: AMP 206044-1
 - 5-pin contacts: AMP 202236-1
 - cable clamp: AMP 206070-1

5.1.2 SMEMA, wiring diagram

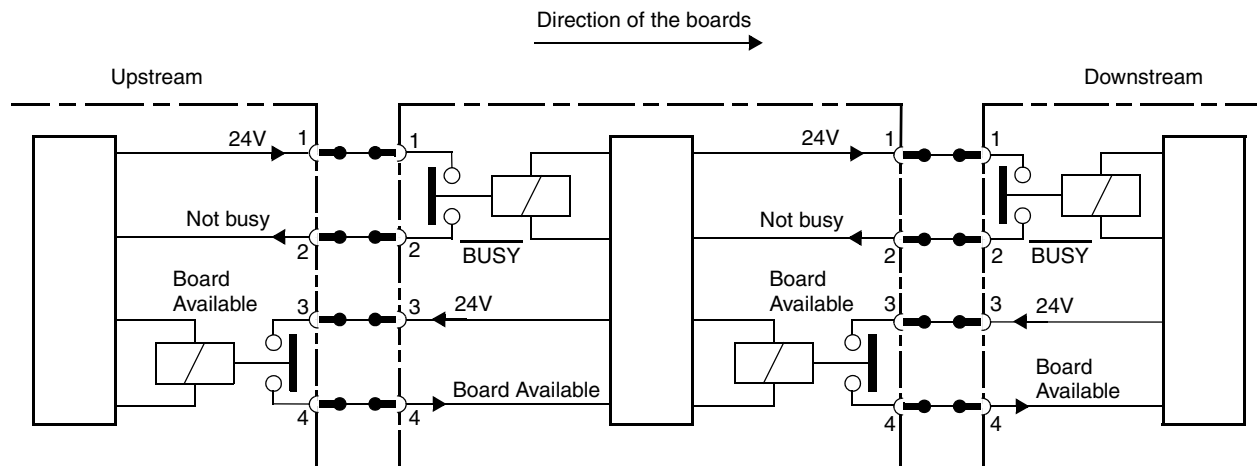


Figure 16 SMEMA diagram

5.2 SMEMA, connecting

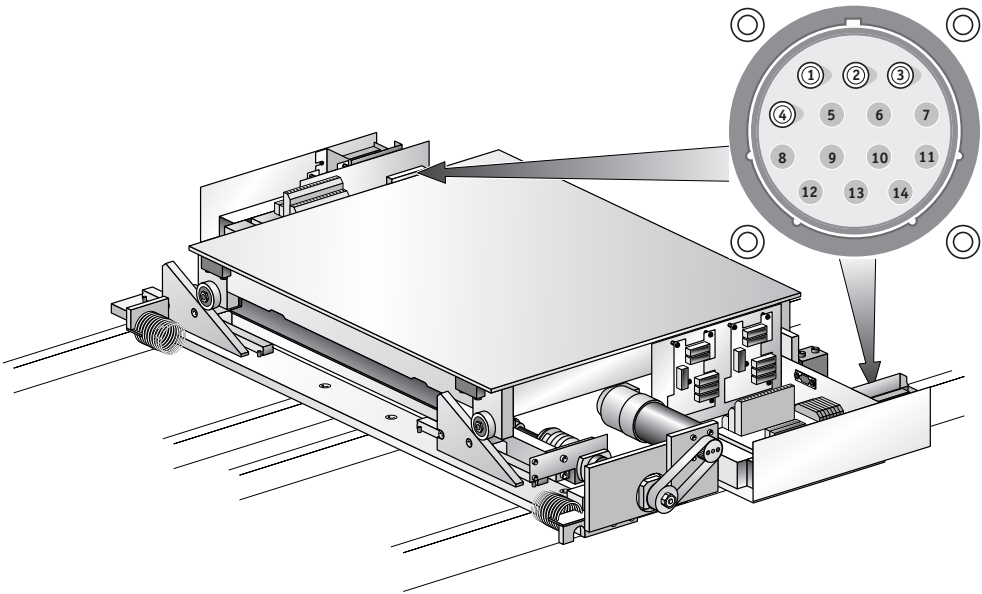


Figure 17 SMEMA connections on board transport

PIN	Connector upstream machine	Connector downstream machine
1	24V from upstream machine	24V to downstream machine
1-2	AX is: NOT BUSY..... 1 - 2 Closed BUSY 1 - 2 Open	Downstream machine is: NOT BUSY: 1 - 2 Closed BUSY 1 - 2 Open
3	24V to upstream machine	24V from downstream machine
3-4	Upstream machine has: BOARD AVAILABLE ... 3 - 4 Closed	AX has: BOARD AVAILABLE 3 - 4 Closed

Figure 18 SMEMA, features

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5.3 External network, connecting

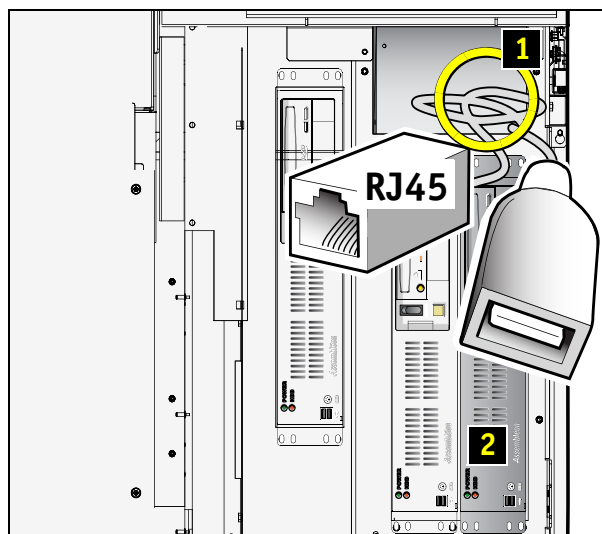
Estimated time to complete [min.]:	-
Required special tools:	-
Required part(s)	Network cable

1. Prerequisites

- Ask the local network administrator for:
 - * DHCP server used, or
 - * IP address, subnet mask and (if the machine is connected to a remote network) default gateway.

2. Connecting the network cable

The machine is pre-wired (1) for an external network connection (RJ45). This wiring is connected to connector X51 of the system controller (2).



3. Start up the system controller

- Power up the machine.
- As soon as the 'Autostart' pop-up screen appears, close this screen in order to prevent the application software to start up.
- Wait until the system controller (ASC) desktop appears, and the pop up screen (APC status window) shows 'Finished firmware validation and downloading'.
- Close the pop up screen.

4. Enable network adaptor

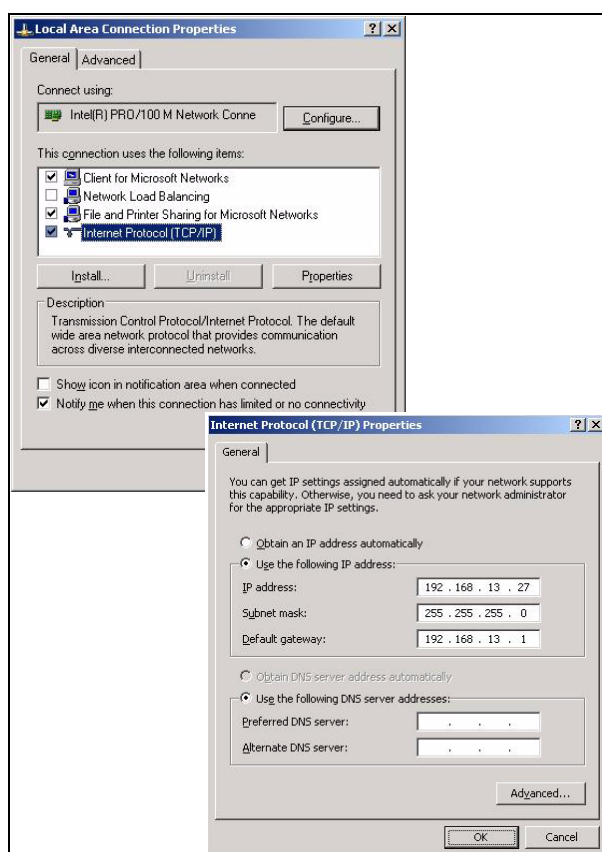
- From the ASC desktop:
- Select 'Start'-'Settings'-'Network Connections'.
- Right-click 'Local Area Connection2' and select 'Properties'.
- Select 'Configure...'
- Select 'Use this device (enable)' and select 'OK'.

5. Set IP address

- Select 'Internet Protocol (TCP/IP)' and select 'Properties'.
- Enter the correct IP address, subnet mask for the customer's network and default gateway (if the machine is connected to a remote network).
(In case of DHCP select 'Obtain an IP address automatically'.)
- Select OK to accept the changes.

6. Finalize

- Shut down and re-start the machine.



Network.fm

CHAPTER 6 Software installation

The machine software is completely installed before the machine is delivered. During installation of the machine no additional steps have to be performed.

Installation or upgrade of software is described in Service Manual AX-201 chapter B8.

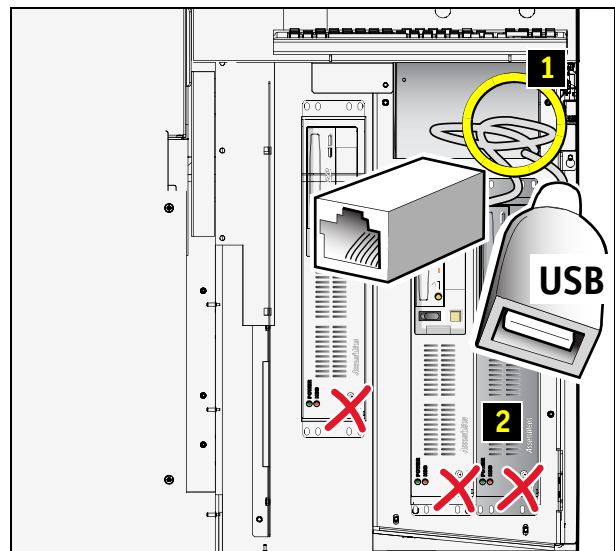
- Install Documentation CD, see Service Manual AX-201 chapter B8.

6.1 USB devices, usage

1. Connecting USB devices

- The machine is pre-wired (1) for USB devices. This wiring is connected to connector X55 of the system controller (2).

Note: Do not use the USB ports in front of the controllers. Unintended closing of the door can harm the USB device.



CHAPTER 7 Final test

7.1 Checks before operation

Before operating the machine for the first time after (re-)installation a few checks have to be done:

- Power up the machine.
- Place calibration nozzles
- Execute a 'refresh front' calibration to update the module calibration values.

7.2 Starting operation

- Check module configuration according to the placement program.
- Change module configuration if required.
- Check the board transport width in relation to the board size in the placement program.
- Check placement program for the required toolbits.
- Install the required nozzles.
- Check placement program for the required feeder setting.
- Install the required feeders.

7.3 Running in simulation mode

- Load the required placement program (see operating manual).
- Enter a new order (see operating manual).
- Activate the order (see operating manual).
- Set the machine to simulation mode without boards (see operating manual).
- Start the machine with the START button on the touch screen.
- Check if the machine runs without problems.

7.4 Acceptance test

The final phase of the installation procedure is the site acceptance test. Depending on the agreements in the sales contract the machine will run a Customer Acceptance test or the standard Assembléon acceptance test.

CHAPTER 8 Machine, relocating

Instructions how an installed machine can be transferred to another location.

- Remove the installed trolleys and feeder banks, use the special lift plate feeder bank.
- Disconnect:
 - the power supply
 - the air connection
 - SMEMA connection to the preceding and/or following machine(s).
- Secure the XY robot, placement heads and control supply unit, see [3.5](#)
- Secure the monitor(s) with arm(s) and, if needed, remove the lamp post.
- Remove the machine anchoring, see [3.7](#)

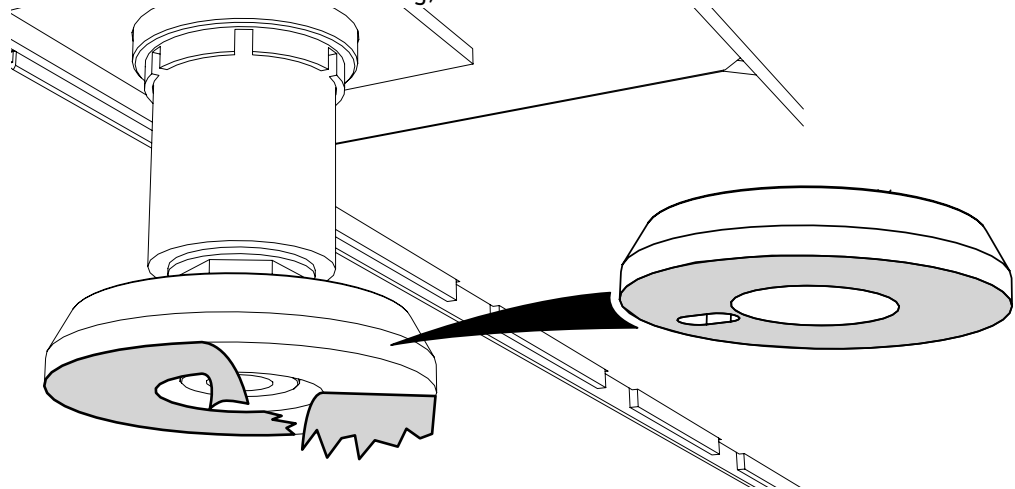


Figure 19 Rubber soles at the bottom of the foot

- After lifting the machine: check the rubber soles at the bottom of the feet. if damaged replace the foot with rubber.
- Machine transportation, see [3.3 Machine, transportation](#)
- Machine re-installation, see [CHAPTER 3 Installation](#)

CHAPTER 9 Special tools

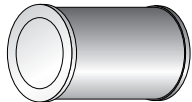




9.1 Tools needed for installation, overview

[9.1.1 Maintenance kit \(PA 2440/00\)](#)

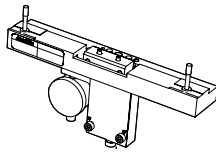

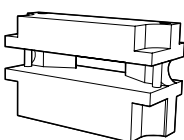


[9.1.3 Setup tooling kit \(PA 2435/00\)](#)

[9.1.4 Recommended standard tools](#)

9.1.1 Maintenance kit (PA 2440/00)

Description	Ordering code	Amount	Used for	
Lubricating kit				
Grease gun	5322-395-10615	1	-	
Flexible hose	9498-396-02040	1	-	
Protection cap	-	1	-	
(Kluber) Isoflex Topas NCA52	5322-390-10151	1	Grease for XY robot bearings	
Lithium based grease NSK 1	5322-390-20159	1	Transport spindles, guides	
Anti score EP lube 3 grease	9498-396-00143	1	Placement head HA Z-motor, guide	
Optical kit				
Camel hair brush, optical tissues	9498-396-00043	1		
Miscellaneous				
Dust catch filter tool	5322-395-10774	1	Replacement tool for filters in placement head HA nozzles	
Board dismantling tool	5322-395-10282	1	Remove controller boards from control supply unit	
Filter element 0.3	9498-396-00062	2	Pneumatic air supply	
Filter (fan)	9498-396-01724	6	Air filter controllers	
Calibre Z-lift	9498-396-01905	1	Z-lift placement heads DV, adjustment	
Tie-wraps 15 cm	-	100	Fixation cables heads	
Tie-wraps 10 cm	-	100	Fixation cables heads	
Flatcable bracket (Large)	-	5	Placement head DV and Z-lift	
Loctite 243	-	1	All screws above Z=0 level unless otherwise defined	
Fuse puller	9498-396-02119	1	Pull fuses from boards	
PU HOSE 4	-	1 mtr	Manifold from AQ to AX-201	

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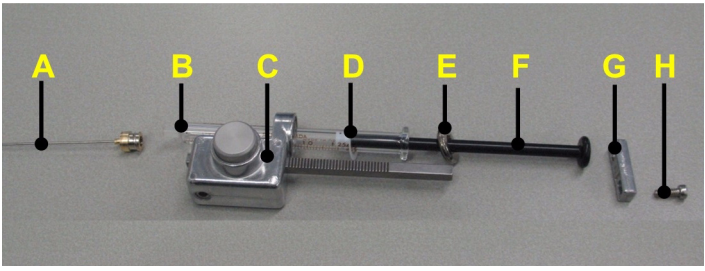

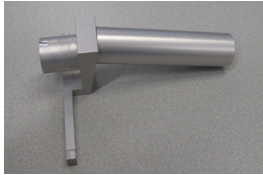
Description	Ordering code	Amount	Used for	
Encoder tool	9498-396-02059	1	Adjustment of encoders on Y-axes	
Plastic distance plate	9498-396-02075	1	X encoder adjustment	
Linear scale mounting tool on X-axis	9498-396-02024	1	-	
Linear scale mounting tool on Y-axes	9498-396-02026	1	-	
Assortment box				
Dust catch filter	5322-480-10169	1	Nozzle placement head HA	
Carbon brushes	9498-396-01388	16	Motors placement head HA	
Fuse slow F5x20 2 A	9498-396-00492	20	All boards	
Fuse slow F5x20 4 A	9498-396-00263	20	All boards	
Screw M1.8X4	5322-502-14433	20	Nozzle	
Screw M2.5X 8	9498-396-00250	10	Sensor Z-lift	
Screw M3X5	9498-396-00390	20	Placement head DV on interface bracket	
Screw M3X6	9498-396-00474	20	Encoder on X-axis	
Screw M3X8	9498-396-00475	20	Manifolds	
Screw M3X16	9498-396-00476	20	Encoder on Y-axes, power supply	
Screw M4X6	9498-396-01882	20	Controllers placement head DV Bracket pneumatic controller	
Screw M4X8	9498-396-01883	10	Clamps, pneumatic controller, fans Y-axis	
Screw M4X10	9498-396-01884	20	Bracket pneumatic controller Z-lift placement heads DV	
Screw M4X12	5322-502-14434	20	Interface placement head HA, bottom	
Screw M4X16	9498-396-01885	10	X-sensor	
Screw M4X20	9498-396-00584	20	Interface placement head HA, top	
Screw M4X25	9498-396-01886	10	BA camera	
Hex lock nut M4	9499-396-00665	10	Fans Y-axis	
Washer 3.2X7	9498-396-00699	20	All M3 screws placement head DV, manifold	
Curved spring washer M3	9498-396-00769	20	All M3 screws	
Curved spring washer M4	9498-396-00903	20	All M4 screws used in X-carriage	

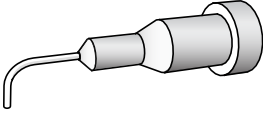
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Description	Ordering code	Amount	Used for	
Washer PF 3.2X7	9498-396-00951	20	Protection boards, manifold, DV controllers	
Washer 4.3X9	9498-396-00904	20	All M4 screws placement head DV on bracket	
Washer PF-CP M2,5	9498-396-01068	20	Manifold placement head HA	
Earth washer STL ST 4.3X8	9498-396-01069	10	Fans, brackets	
Earth washer STL ST 5.3X10	9498-396-01082	10	Hood, side plate	
Earth washer STL ST 6.4X14	9498-396-01188	10	Earth to covers	
O-ring placement head HA	5322-530-10386	10	Nozzle interface	
O-ring 2.3 x 0.9	5322-530-51243	10	Behind pressure sensor on manifold HA Pneumatic controller interface	
Sealing plate	5322-466-12073	10	For nozzles placement head HA	
Fixing eye of tie-wrap	9498-396-01394	10	Cables in control supply unit	
Hose pillar RTU-PK-3/3	9498-396-01881	6	Manifold from AQ to AX-201	
Contact pen	9498-396-00125	5	Trolley to lift electrical interface	
PCB spacer RLCBSRE-10	9498-396-01887	10	Placement head HA, transport controller in control supply	
Cable clamp	9498-396-01888	10	Base	
Cable clamp 4.8	9498-396-01889	10	Encoder cable, BA camera	
Flatcable bracket (Small)	-	5	Control supply unit	
End stop Z-lift DOWN	9498-396-01892	4	Z-lift placement head DV	
End stop Z-lift UP	9498-396-01893	8	Z-lift Placement head DV	

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9.1.2 Lubricating tool for placement head DV and Z-lift

Placement head lubrication tool 9498-396-01954			
A	Needle (set of 6)	9498 396 01998	
B	Container	9498 396 02000	
F	Plunger		
C	Dispenser	9498 396 01999	
D	Nylon ring		
E	Flange screw		
G	Plunger arm		
H	Screw		
Grease (IKO)		9498 396 02001	
Needle guidance		9498 396 01996	

Bended needle		9498-396-02438	
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9.1.3 Setup tooling kit (PA 2435/00)

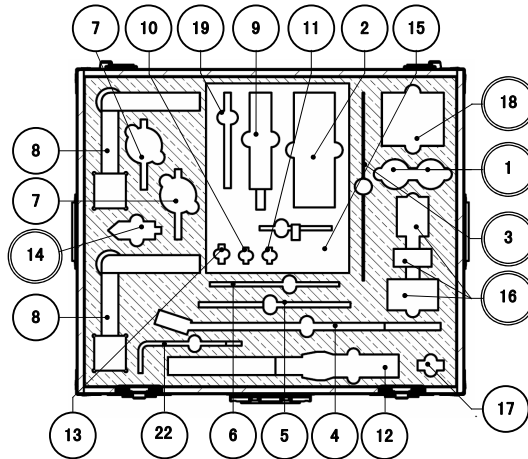


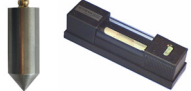

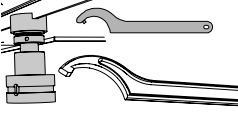

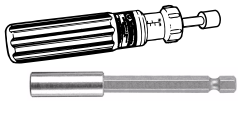


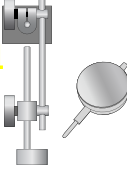
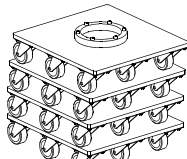


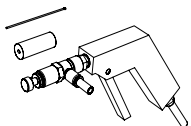
Figure 20 Setup tooling kit , contents

Item	Description	Qty	Ordering code	Application	Identification and picture
1	Calibration nozzle	2	5322-360-10311	Calibration, placement head HA	
18	Nozzle set 5 x L8	1	9498-396-01874	Calibration, placement head DV	
2	Spirit level	1	9498-396-00097	Levelling	
14	Plumb line	1	-	Positioning	
4	Open ended spanner 36 mm	1	9498-396-00037	Levelling, mounting on crate bottom	
5	Hook spanner 68-75	1	9498-396-00035		
16	Levelling jig	1	9498-396-02082	Machine levelling (Hook spanner 68-75 is item 5)	
6	Hook spanner 45-50	1	9498-396-02078		
12	Torque wrench 10-100 Nm	1	9498-396-02079		
17	Bit holder insert tool	1	9498-396-02080		
13	Hex bit 8 mm	1	9498-396-02081		
9	Torque screw driver 0-6 Nm	1	9498-396-02084		
19	Extended bit holder 150 mm	1	9498-396-02085		
11	Ball hex 4	1	-		
10	Ball hex 3	1	-		
22	Panel removal key	1	9498-396-02083		
3	Transport calibration plate	1	5322-466-11588	Calibration	
7	Clock gauge	2	9498-396-00181	Levelling, range 10 mm, accuracy 0.01 mm. Support	
8	Measuring support	2	9498-396-00182		

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9.1.3.1 Setup tooling, optional tools

Description	Ordering code	Application	Identification and picture
Installation wheel set	9498 396 00145	Set of 4 lorries for manual machine transportation.	4022 510 1763 

Description	Ordering code	Application	Identification and picture
Placement head cleaning tool	9498-396-00558		

9.1.4 Recommended standard tools

Quantity	Description
1	Open end/ring wrench 5 mm
1	Open end/ring wrench 5.5 mm
1 set	Open end/ring wrenches 6 - 24 mm
1	Socket screwdriver 4 mm
1	Socket screwdriver 5 mm
1	Socket screwdriver 7 mm
1	Socket screwdriver 8 mm
1	Socket screwdriver round-head 2.5 mm
1	Socket screwdriver round-head 3 mm
1	Socket screwdriver round-head 4 mm
1	Socket screwdriver round-head 5 mm
1	Allen key 0.9 mm
1	Allen key 1.27 mm
1 set	Allen key 1.5 - 10 mm
1 set	Allen wrenches (short)
1 set	TORX screwdrivers T7 - T40
1	Screwdriver TORX T6
1	Screwdriver TORX T7
1	Screwdriver TORX T10
1	Screwdriver TORX T15
1	Screwdriver no. 1 insulated
1	Screwdriver no. 2 insulated
1	Screwdriver no. 3 insulated
1	Screwdriver no. 4 insulated
1	Screwdriver no. 5 insulated
1	Screwdriver no. 4 short
1	Screwdriver no. 4 square
1	Screwdriver clamping M2 - M3.5
1	Screwdriver clamping M3.5 - M5
1 set	Precision screwdrivers
1	Phillips screwdriver no. 0
1	Phillips screwdriver no. 1
1	Phillips screwdriver no. 2
1	Measuring tape 2 meter
1	Calliper gauge 150 mm
1 set	Feeler gauges 0.03 - 0.5 mm
1	ESD-set
1	Multi meter

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